NATURAL ENVIRONMENT RESEARCH COUNCIL

INSTITUTE OF GEOLOGICAL SCIENCES

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ASSESSMENT OF BRITISH SAND AND GRAVEL RESOURCES No. 3

The sand and gravel resources of the area south and west of Woodbridge, Suffolk

Description of 1 : 25 000 resource sheet TM 24

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London: Her Majesty's Stationery Office 1972

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Preface

It has become increasingly clear in recent years that an assessment of resources of many minerals should be undertaken. This is a Report of the Mineral Assessment Unit which was set up in May 1968 to undertake such work. It describes and quantifies the resources of sand and gravel of 91.2 km^2 of country south and west of Woodbridge, shown on the accompanying 1:25 000 resource sheet TM 24.

This survey is concerned with assessing sand and gravel resources on a regional scale at the indicated level; the deposits are not outlined completely nor their grade established throughout. The work may be regarded as the application to large areas of methods used commercially for evaluating reserves on small sites. It may be regarded also as an extension of geological mapping by providing information about the thickness and quality of deposits.

The survey was conducted in 1968-69 by Dr. R. Allender assisted by Mr. S.E. Hollyer as field officer, who supervised the drilling and sampling programme and helped in the preparation of data for this publication. Mr. J.D. Ambrose supervised drilling for a short period at the beginning of the programme. The work is based on a 1:63 360 scale geological survey originally published in 1881-1883 on parts of Old Series sheets 48, 49 and 50, reprinted with corrections and additions on New Series one-inch sheets 207 (Ipswich) and 208 and 225 (Woodbridge and Felixstowe) first published in 1927 and 1928 respectively (and subsequently at intervals) and now presented at the 1:25 000 scale, incorporating minor amendments resulting from the present work.

Mr. J.W. Gardner, C.B.E. (Land Agent) has been responsible for negotiating access to land for drilling. The ready cooperation of land owners and tenants in this work is gratefully acknowledged. Special thanks are due to Dr. T.L. Thomas of the Royal School of Mines, London, for his advice on methods of resource calculation.

Financial support for the survey was provided by the Department of the Environment.

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1 September 1972

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CONTENTS

ILLUSTRATIONS

TABLES

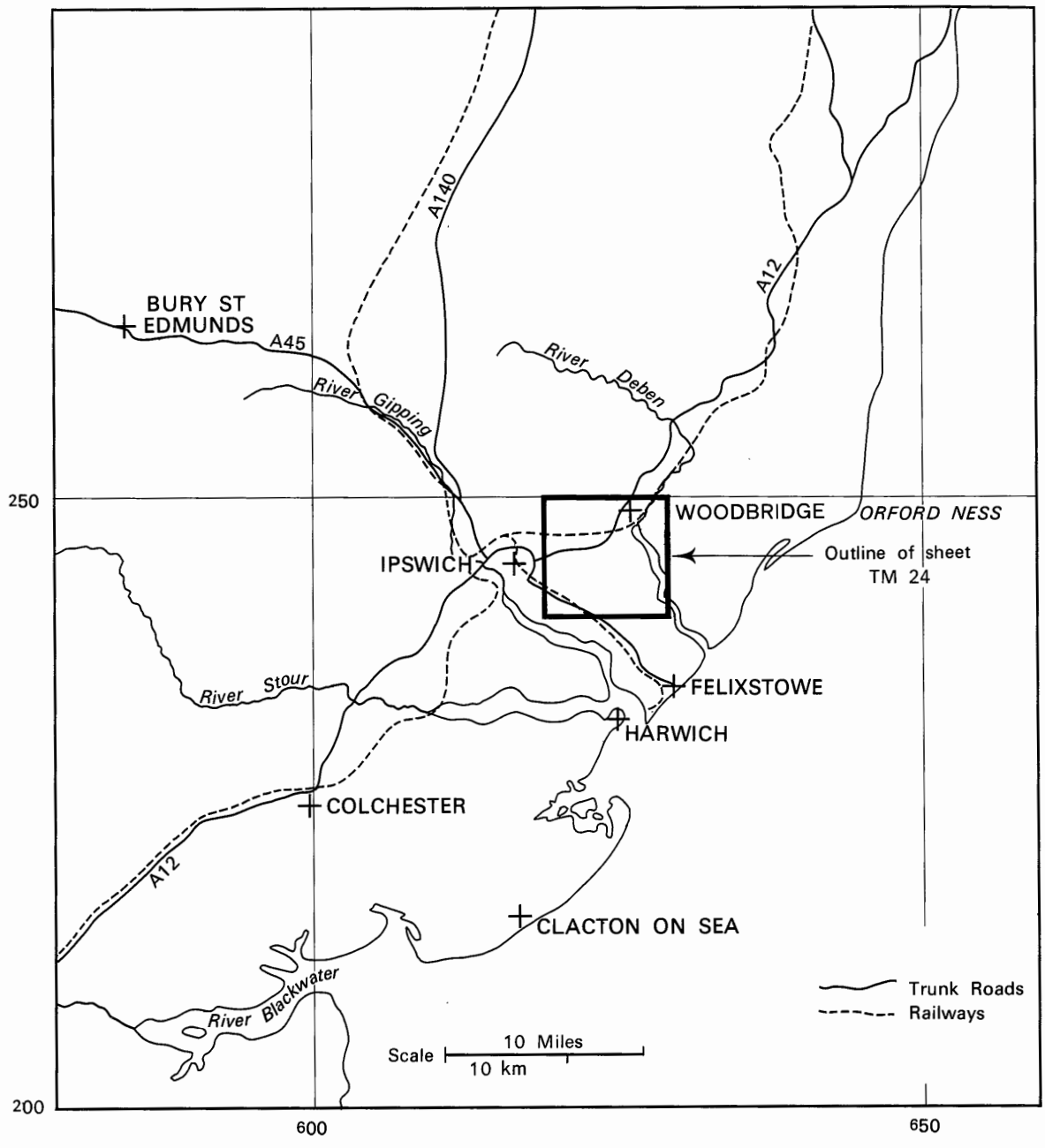


Fig. 1. Map showing the location of Sheet TM 24

contains roughly 10 km^2 of sand and gravel.

The consequent limitation of the use to which the results can be put must be emphasised. The assessments of quantity and composition apply to the resource block as a whole.

> Valid conclusions cannot be drawn about the mineral in parts of a block, except in the immediate vicinity of the actual sample points.

It follows that reserves, which are accurately demarcated areas of economically workable mineral, must be proved by the customary detailed exploration undertaken by the industry. However, the information provided about the resource blocks in an area may assist in the selection of the best targets for such commercial exploration and evaluation.

Thus the work can be regarded as the statistically controlled application to large areas of methods similar to those applied by industry to establish the existence of workable reserves on a relatively small site, and also as an extension of conventional geological mapping techniques, which delineate (with varying degrees of accuracy, depending, for example, on the presence of cover) the areal extent of deposits.

PROCEDURE

Trial and error during preliminary studies showed that for the complex and variable

glacial deposits of East Anglia and Essex, an absolute minimum of five sample-points evenly distributed across the sand and gravel are needed to provide a worthwhile statistical assessment, but that, ideally, there should be no fewer than ten. Sample-points are any points for which there exists adequate information about the nature and thickness of the deposit and, apart from the holes drilled during the survey, may include exposures and other boreholes. In particular, the cooperation of sand and gravel operators has ensured that boreholes have not been drilled where reliable information was already available. Such data is held confidentially by the Institute and cannot be disclosed, although it may have been used in the calculations.

The mineral on each 1:25 000 sheet is divided into resource blocks. The arbitrary size selected, 10 km^2, is a compromise to meet the aims of the survey and to provide sufficient sample-points in each block. As far as possible the block boundaries are determined by geological boundaries; for example, wherever practicable plateau and river terrace gravels are separated. Otherwise division is by arbitrary lines, which may bear no relationship to the geology. The blocks are drawn provisionally before drilling begins.

A reconnaissance of the ground is carried out to establish whether there are any exposures, and inquiries are made to ascertain what borehole information is available. Borehole sites are then selected to provide an even pattern of sample-points at a density of approximately one per square kilometre. Ideally the distribution should be unbiassed with respect to the geology, to ensure that the data obtained is representative of any broad trends in the variation in thickness or grading as this will govern spot values.

However, because broad trends are independently overlaid by smaller scale variations, characteristically random in form, it is unnecessary to adhere to a square grid pattern. Thus such factors as ease of access and the need to minimise disturbance to land and the public have been taken into account in siting the holes: at the same time it has been necessary to guard against the possibility that ease of access (that is, the positions of roads and farms) may reflect particular geological conditions, which may bias the drilling results. The built-up area of Woodbridge has been avoided, but otherwise in siting the boreholes or in the subsequent calculations, no account is taken of any factors, for example, roads, villages and areas of high agricultural and landscape value, which might stand in the way of sand and gravel being exploited. The estimate of total volume of sand and gravel will therefore bear no simple relationship to the amount that could be extracted in practice.

Ideally the drilling machine employed should be caplable of providing a continuous sample representative of all the unconsolidated deposits. So that the in-situ grading can be determined, if necessary, to a depth of 30 m at a diameter of about 200 mm, and beneath different types of overburden. It should be reliable, quiet, mobile and relatively small (so that it can be moved to sites of difficult access) and it should be fast. Although uncased continuous flight power augers can meet these requirements in some ground they fail either below the water table or in some clay-free sands and gravels when the mineral will not stay on the flights. In such circumstances materials can be recovered by bailing. However, not only is this method slow, but there is a tendency for the pumping action to draw unwanted material into the hole either from the sides or the bottom. On the area covered by the sheet here described, the German Wirth B1 drill (or B0 modified) has been used extensively. With this machine, casing can be advanced at the same time as the hole is being drilled, thus minimising disturbance to the ground, and avoiding contamination and caving. In difficult ground a bailer can be substituted for the auger. Other machines, including conventional 'shell and augers', have also been used.

A continuous series of bulk samples is taken taken throughout the thickness of sand and gravel. Ideally, samples are composed exclusively of the whole of the material previously occupying the space defined by the hole's ideal dimensions, as determined by the internal diameter of the casing and the thickness penetrated. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel. or for every 3 ft (0. 9 m) of depth. The samples are despatched in heavy-duty polythene bags to a laboratory for grading. Care is taken to discard, as far as possible, material which has caved, or been pumped from the bottom of a hole. The samples sent for analysis each weigh 60-100 lb. The grading procedure is based on BS 1377: 1967. Random checks are made on the accuracy of the laboratory grading.

All data, including mean grading analysis figures calculated for the total thickness of the mineral, are recorded on standard record sheets, abbreviated copies of which are

appended to this report.

The methods used in computing the estimates of volume and other statistics for each of the resource blocks are described in Appendix A and the results are quoted on page

THE MAP

The sand and gravel resource map is folded into the pocket at the end of this report. The base map is the Ordnance Survey 1:25 000 Outline Edition in grey, on which the topography is shown by contours in green, the geological data in black and the mineral resource information in shades of red.

Geological Data

The geological boundary lines and symbols shown are taken from the published one-inch New Series geological maps, the Ipswich (207) Sheet and Woodbridge and Felixstowe (208/225) sheets, with minor amendments. These maps are based on 'Old Series' surveys on the one-inch scale carried out in 1881-83; because no six-inch geological maps are yet available for the area, the new borehole data, which include the stratigraphic relations and mean particle size analyses of the sand and gravel samples collected during the assessment survey, reveal some, mainly minor, inconsistencies in the original geological mapping in some localities. Nevertheless the geological boundaries are regarded as the best interpretation of the information available at the time of survey. Even with large scale mapping, it is inevitable, particularly with glacial deposits (such as those included in the area of sheet TM 24) which change rapidly vertically and laterally, that local irregularities or discrepancies will be revealed by some boreholes (for example, at boreholes SE 19, SE 22 and SE 25). These are taken into account in the assessment of resources (see below and Appendix A).

Mineral Resource Information

For assessment purposes the map is divided into areas of mineral and areas where sand and gravel is either not potentially workable or absent. (For definitions of 'mineral' and 'potentially workable' see p. 1).

On sheet TM 24 the mineral is subdivided into areas where the mineral crops out, and areas where mineral is present in continuous or almost continuous spreads beneath overburden. The area of exposed sand and gravel as mapped is considered as mineral, although there may be small patches where sand and gravel is absent or not potentially workable.

Beneath overburden, mineral may be continuous (or almost continuous) or discontinuous. The recognition of these categories is subjective, depending on the proportion of boreholes which did not find potentially workable sand and gravel and their distribution within a block. The 'discontinuous' category has not been recognised on the present sheet.

Areas of outcropping bedrock, areas where sand and gravel is interpreted to be not potentially workable and areas not assessed are shown uncoloured on the map.

In all these areas it has been assumed that mineral is either absent except in infrequent and relatively minor patches or cannot be assessed quantitatively in the context of this survey.

The areas of the exposed sand and gravel and of bedrock are determined from the mapped geological boundary lines.

Description of Sheet TM 24

GENERAL

Although it is partially underlain by sand and gravel, no assessment has been made for the built-up area of Woodbridge, which occupies 4.0 km^2 of the map. Any deposits which may be present beneath the waters of the Deben estuary (4.8 km^2 in area) have also been excluded from the survey. A statistical assessment has been made of 75.8 km^2 of mineral-bearing ground which forms the main plateau-feature of the sheet area. Because of the relatively small area involved (1.4 km^2), it has been possible to make only an inferred assessment of certain patches of river terrace deposits present on the lower slopes of the valleys of the Deben and its tributaries, which occupy some 14.0 km^2, mainly of London Clay.

TOPOGRAPHY

The major physiographic feature of the area is the drowned valley of the River Deben, which broadens in a generally southerly direction passing to the east of Woodbridge. The Deben has two main tributaries, both joining it from the west: The River Fynn in the north, flowing from Playford to Martlesham Creek, and the Mill River in the south flowing from Foxhall to Bucklesham Creek. Away from the valleys, the ground surface slopes gently from over 150 ft (46 m) above O.D. in the north-west to less than 25 ft (7.6 m) above O.D. in the south-east. In contrast to the

fairly level ground of the Glacial Sand and Gravel, the boulder clay country around Culpho, in the north-west, is more varied topographically.

GEOLOGY

The deposits overlying London Clay in this area can be divided into two groups, based on their age and mode of origin. The lower comprises two formations of Pleistocene age, the Red Crag and some beds that will be called the Chillesford Beds in this Report. Although these latter beds are lithologically similar the Chillesford Beds of the type area, absence of six-inch mapping and other direct stratigraphic evidence precludes definite correlation between the two sets of beds. The Red Crag and the Chillesford Beds are interpreted as having been deposited in shallow marine and estuarine environments. The overlying later Pleistocene deposits, Glacial Sand and Gravel and Chalky Boulder Clay, are non-marine and were deposited during the Great Ice Age. The boulder clay is thought to be the ground moraine deposited during the decay of an ice sheet, while the Glacial Sand and Gravel was probably deposited by outwash streams and rivers, of varying strength, mainly issuing from an ice sheet to the north and west. The present southern limit of the boulder clay is believed to represent the approximate maximum extent of the ice mass.

Over the whole area, London Clay forms the bedrock to the younger unconsolidated deposits, the majority of which consist of sand with some gravel. The London Clay crops out on the slopes of the tributary valleys of the River Deben and along the shore line of the estuary, forming the lower part of the river cliff. In the majority of Mineral Assessment Unit boreholes, it comprises a stiff, blue-grey clay, with occasional layers of concretionary 'cement-stones'. In most assessment boreholes, the London Clay is unweathered or only weathered to a depth of a few inches. However, in boreholes near the Deben shore-line, or when seen at outcrop, the clay is uniformly weathered to an orange-brown colour.

The surface of the London Clay falls from a height of over 60 ft (18 m) above O.D. in the northern and western parts of the area to less than 10 ft (3 m) above O.D. in the south-east (see Fig. 2). However, the surface does not slope regularly but consists of a series of ridges and basins. The best example is the deep oval basin extending from Brightwell to Waldringfield with an approximately east-north-east trending axis, flanked on the south-east by a well-marked ridge from White Hall to Manor Farm, with the highest point more than 50 ft (15 m) above O.D. The lowest part determined by assessment boreholes is only 1 ft (0.3 m) above O.D. The slope of this basin is steepest on the northern side where it drops at least 30 ft (9.1 m) in a distance of about 700 yd (640 m), a slope of approximately 1 in 70. Other well marked ridges occur in the Martlesham area and north of Levington, and a basin around Little Bealings.

The Red Crag, which immediately overlies the London Clay, is divisible into two distinct parts, a lower part containing shells (lower Crag) and an upper without shells (upper Crag). This sub-division is persistent over the whole area and is considered by the authors to represent two distinct phases of deposition in Red Crag times. In a few boreholes there is evidence of a break in sedimentation between the two divisions, with a pebble bed developed at the junction, although this is not normally present. A temporary excavation at Martlesham Heath [250 448][1] showed both a pebble bed at the base of the upper Crag and truncation of sedimentary structures in the lower Crag. It is thought to be highly improbable that the upper Crag is simply decalcified shelly Crag as has been suggested (for example, by Boswell, 1928, p. 29).

The lower Crag consists of reddish-brown ferruginous sand, often strongly current-bedded, in which shells and shell debris are usually abundant. The shells are never in the position of growth and show the effects of current sorting and abrasion, bivalved shells being normally disarticulated. The percentage of shell material and the degree of abrasion vary considerably although in any one bed the size of the shell fragments is often fairly uniform (apart from the tougher shells such as gastropods, which are much more resistant to abrasion and may be regarded as light-weight 'pebbles'). In a few cases thin layers of shell-free sand are interbedded with the shelly sand; ironstone bands and nodules occur in places, and at the base of the formation there is often a concentration of rounded black flint pebbles, phosphatic nodules and 'coprolites'. The last-named include rolled and rounded fish teeth, bones and faecal remains, often derived from older beds. This basal bed was formerly exploited for phosphate

[1] National Grid References in this publication all lie within 100 km square TM (62)

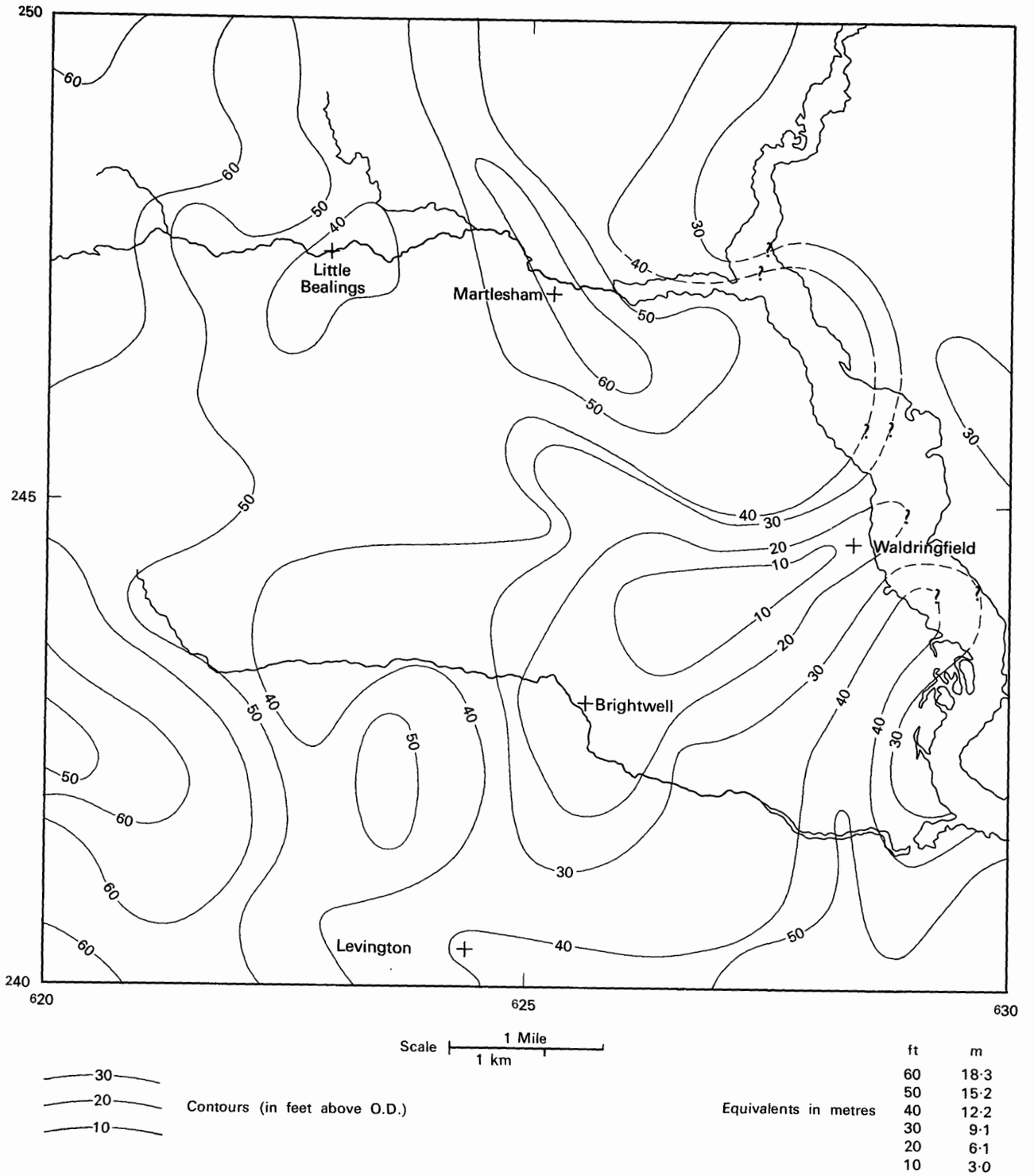


Fig. 2. Contour map showing the form of the London Clay surface

in a number of places, as for example, around Waldringfield.

The upper Crag consists of reddish-brown sands, often strongly current-bedded, with occasional seams of red silt and thin clay. Scattered layers and lenses of gravel occur. composed of rounded quartz and black flint.

The weighted mean thickness of the lower shelly Crag, 4.2 m, is very similar to that of the upper, non-shelly Crag, 4.3 m. However, the ratio of the thickness of these two parts varies considerably from place to place. Of the ninety-two assessment boreholes proving Red Crag, the two parts occur together at eighty-two sites (one or other being absent at the other ten). In forty-eight of these eighty-two boreholes upper Crag was thicker than lower Crag, in thirty lower Crag was the thicker, and in four they were of equal thickness. The variations in thickness are indicated in Table 1.

The thickness of the lower Crag is directly related to the present day form of the top of the London Clay in some areas. Where this is so the lower Crag is thickest in the basins and thinnest or even absent over the ridges (see Figs. 2 and 3), its upper surface being an approximately level plane sloping toward the east-south-east at a gradient of about 1 in 1500. It seems likely that this plane surface has remained relatively undisturbed since the end of lower Crag times. The Red Crag sea probably encroached from the south-east over a London Clay surface already flexed or eroded into a series of ridges and basins, filling the basins with Crag deposits and eventually covering all but islands of London Clay. In other parts of the area, the upper surface of the lower Crag (and indeed often those of all the overlying deposits) mirrors the form of the London Clay surface, and the thickness of the lower Crag is not directly related to the shape of the London Clay surface (see Figs. 4 and 5). Post-depositional movements, resulting in the production of a series of gentle flexures, the axes of most of which are normal to the boulder clay ice margin, might account for this. These movements may have been due to late Pleistocene tectonic activity sensu stricto, or to some form of superficial glacial movement such as large-scale frost heaving, or to both. The size of the structures suggests that the former might have been more important.

At thirteen assessment borehole sites in the northern and south-western parts of the area, the upper Red Crag is overlain by strata classified as Chillesford Beds, hitherto unrecorded in the area (Fig. 6). These are regarded as being of marine or estuarine origin, and consist of fine sand, silt and clay

Table 1. Block-by-block thickness variations in the Red Crag (excluding Chillesford Beds) (figures in metres).

	Red Crag total thickness		upper part		lower part	
Block	Mean	Range	Mean	Range	Mean	Range
A	8.2	2.7 to 12.2	5.0	0.6 to 8.1	3.2	0.1 to 8.7
B	9.3	7.0 to 14.1	4.0	0 to 14.1	5.3	0 to 11.5
C	7.6	2.0 to 12.2	2.9	0 to 10.4	4.7	0 to 8.5
D	9.5	5.5 to 12.8	5.0	0 to 9.5	4.8	0 to 9.2
E	10.5	4.6 to 19.2	5.5	1.3 to 9.1	5.0	0.9 to 12.2
F	7.6	5.5 to 11.3	4.3	0.9 to 8.2	3.3	0.9 to 5.8
G	4.5	1.5 to 5.5	3.2	0.6 to 5.5	1.4	0 to 4.6
Weighted means for TM24	8.5	1.5 to 19.2	4.3	0 to 14.1	4.2	0 to 12.2

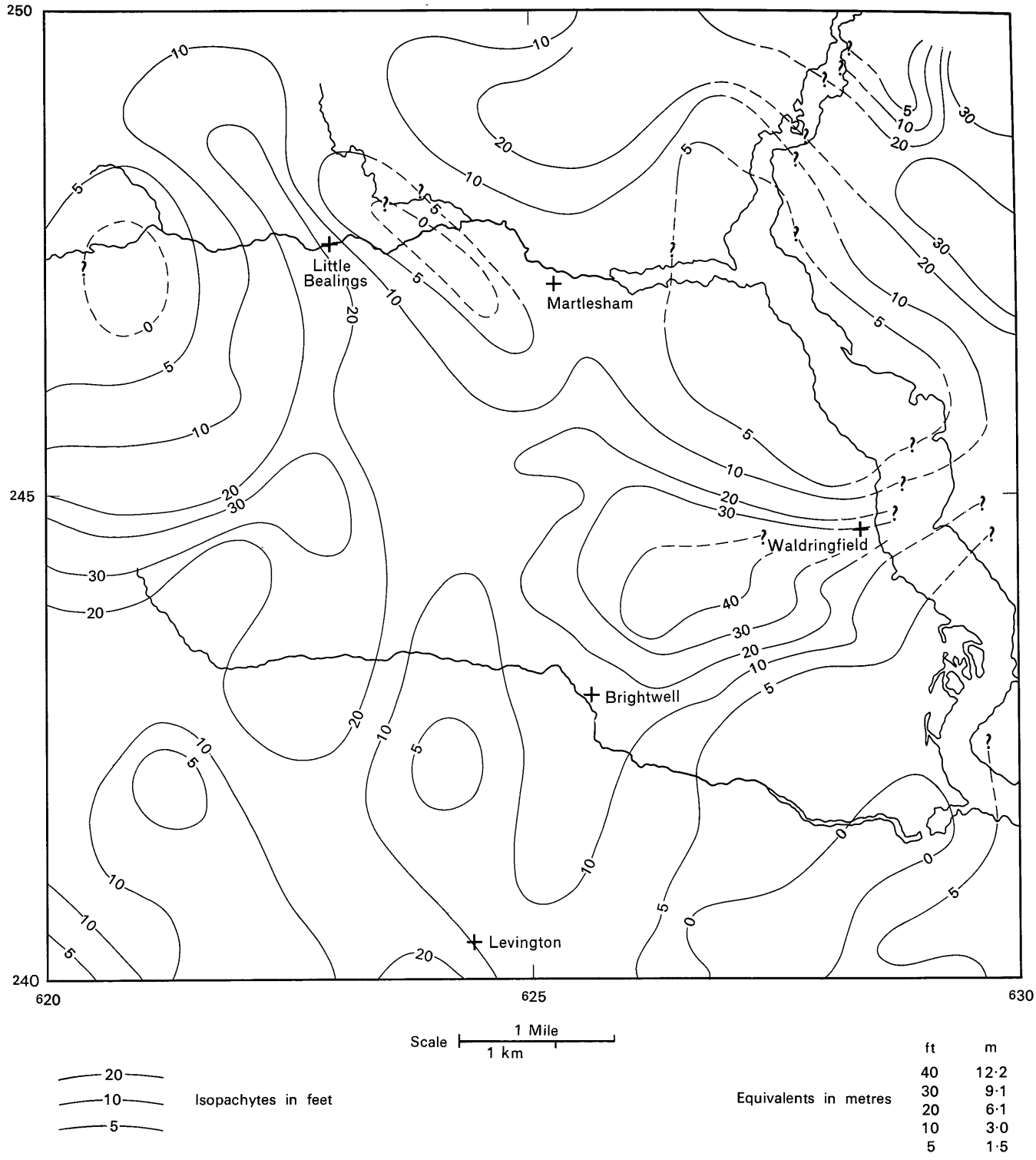


Fig. 3. Isopachytes of the lower (shelly) Red Crag

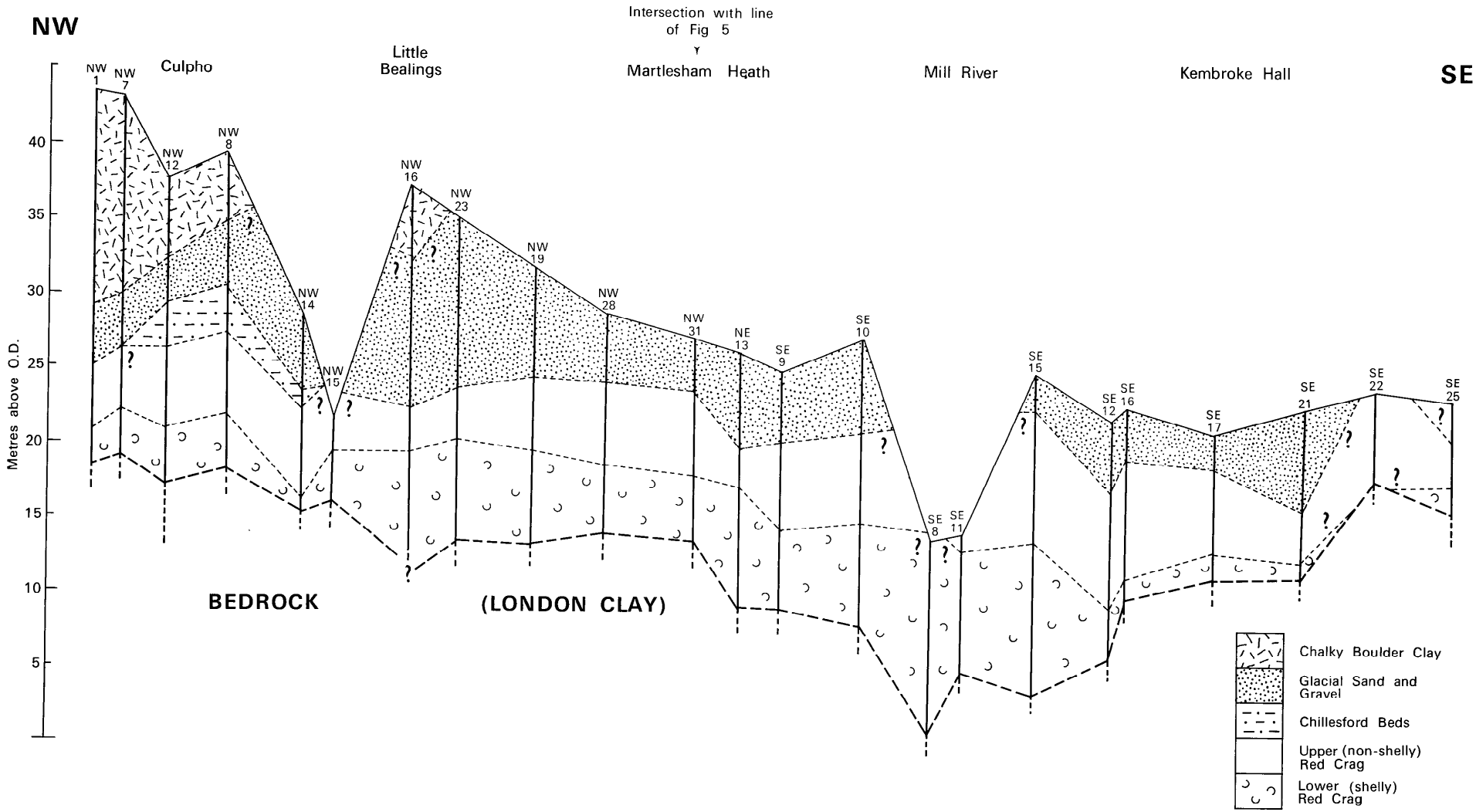


Fig. 4. A geological section drawn by normal projection of borehole data onto a NW-SE vertical plane

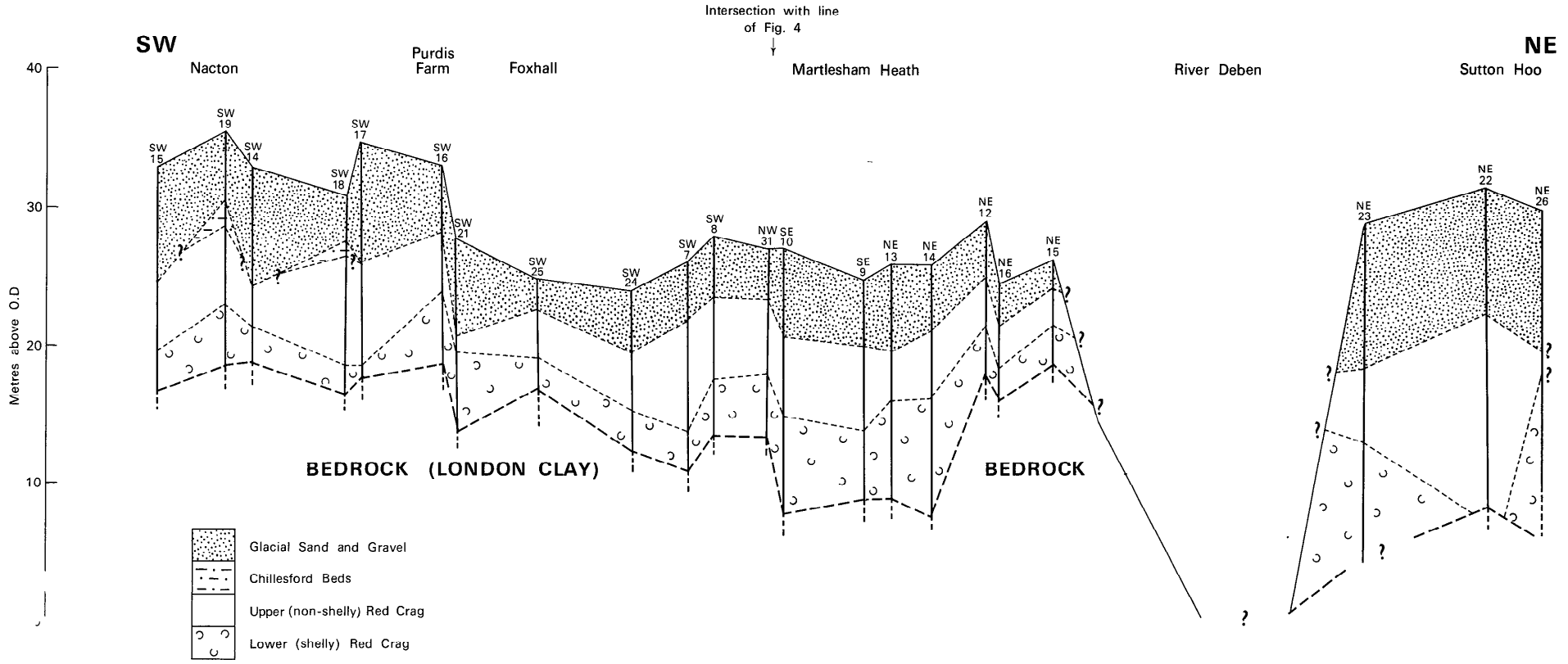


Fig. 5. A geological section drawn by normal projection of borehole data onto a SW-NE vertical plane

with subordinate coarse sand and gravel, all of a predominantly green colour. The silts and clays are usually highly micaceous, and where percussive drilling provided cores they were seen to be finely laminated. Carbonaceous patches are common, and in one borehole (NW 14) 3 ft (0.9 m) of black peaty clay was penetrated. Ironstone bands and nodules occur sporadically. The Chillesford Beds vary in thickness from 3 ft (0.9 m) to 21 ft (6.4 m) (see Fig.6), the mean value of the thicknesses recorded in assessment boreholes being $10\frac{1}{2}$ ft (3.1 m). They are not found at outcrop in this area, being everywhere overlain by Glacial Sand and Gravel. Locally, a basal pebble bed is present, probably indicating a break in deposition between Chillesford Beds and the underlying Red Crag. Where present in the boreholes, Glacial Sand and Gravel commonly overlies the upper Crag, although in four the substratum is lower Crag and in 13 it is Chillesford Beds. Glacial Sand and Gravel was nowhere found to rest directly on London Clay, although the map shows this near Playford (see description of block A).

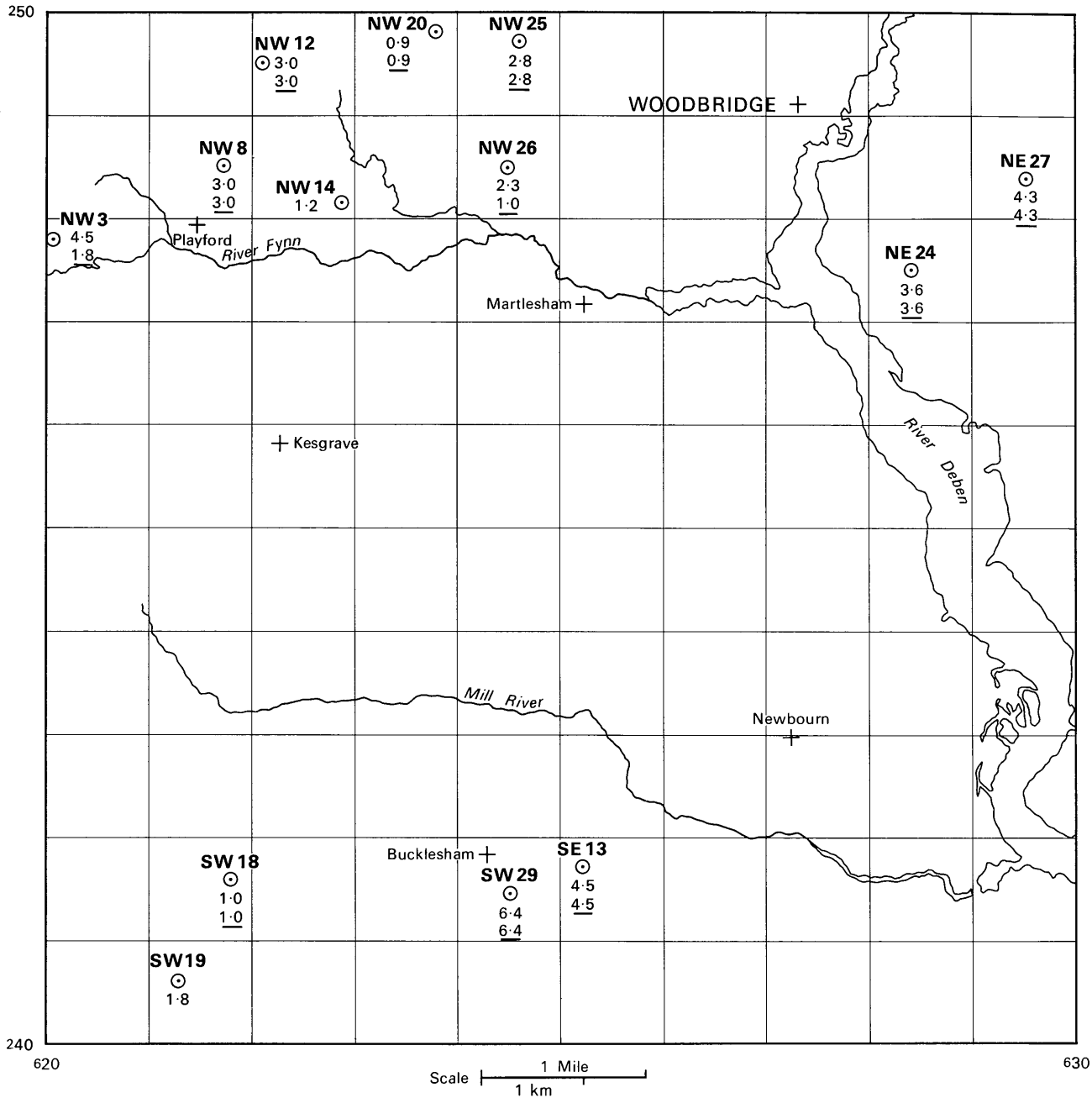
The Glacial Sand and Gravel consists of pale yellow or brown sands with varying but almost always subordinate amounts of gravel. The gravel commonly occurs as the infilling of lenticular channels, which cut down into the more sandy parts of the formation. The horizontal extent and thickness of the channel deposits vary from a few feet to some tens of feet, so that in some cases they cut down into the Red Crag below (see description of block C). A crude vertical grading is often seen in the gravel deposits, with the coarsest material at the base. In some cases where pebbles are absent it is difficult to distinguish Glacial Sand and Gravel from Red Crag, especially as much of the glacial material may be derived from the Crag. Usually the Glacial Sand and Gravel is less ferrunginous and therefore lighter in colour than the Red Crag, although strong secondary iron staining has been seen in some pits. Secondary cementation, by iron compounds and by manganese, may occur, resulting in a hard conglomeratic deposit, the bounderies of which do not usually conform to the original bedding. Beds of silt and clay may occur within the Glacial Sand and Gravel; the presence of such sedimentary structures as current bedding, ripple marking, grading, and intra-formational mud-pellet conglomerates indicates a fluviatile origin.

The mean value for the thickness of Glacial Sand and Gravel for TM 24 as proved by assessment boreholes is $18\frac{1}{2}$ ft (5.7 m) although it ranges up to 45 ft (13.7 m). Of the total area of Glacial Sand and Gravel (60.1 km^2), the deposit at outcrop occupies 52.6 km^2, the remaining 7.5 km^2 occuring beneath boulder clay. At outcrop there is often a concentration of coarse material in the upper 2-3 ft irrespective of the altitude or thickness of the deposit, suggesting that fines have been removed by long exposure to recent erosion processes.

Chalky Boulder Clay occupies an area of about 7.5 km2 mainly in the north-west, north of the River Fynn. The thickness recorded at assessment boreholes range from 5 ft (1.5 m) to 47 ft (14.3 m) with a mean value of $22\frac{1}{2}$ ft (6.9 m). When fresh, the deposit consists of a stiff blue-grey clay with abundant chalk and flint, and less commonly, other erratics including sandstones, quartzites and igneous rocks. The degree and depth of weathering to brown, largely decalcified, stony clay varies considerably from site to site. Layers of almost stoneless clay, and thin lenses of sand and gravel are sometimes present within the boulder clay. The percentage of stone is often greatest at the base of the deposit, and in such cases the description 'chalky clayey gravel' may be appropriate. The boulder clay is unconformable on the Glacial Sand and Gravel (see description of block A).

Deposits mapped as Valley and Terrace Gravels are present mainly on the west bank of the Deben and on each bank of the River Fynn. The results of this survey indicate that some of these contain very little gravel, and the geological classification of others has been revised. Assessment boreholes proved silty non-shelly Red Crag overlying deeply weathered London Clay in two of the larger areas originally mapped as terrace [293 412] and [290 420] east-north-east of Kirton Lodge and east-south-east of Hemley. The 'terrace' [286 444] forming the cliff at Waldringfield also proved to consist of non-shelly Red Crag. All three 'terraces' form ridges over 30 ft (9 m) above O.D, and thus do not have a typical terrace form. Being contiguous with the Red Crag outcrop they have been included with it for assessment purposes and classified as such on the resource map.

Of the remaining fifteen areas mapped as terrace, five have very thin deposits, consisting principally of clays and silts, and their boundaries are uncertain in places. Of these five areas, the terrace east-north-east of Hemley Hall [289 433] is the least well defined and London Clay was proved, by hand augering, at a depth of 2 ft, (0.6 m) near its



NW 3 ← Borehole Registration Number

⊙ ← Position of borehole

4·5 ← Total thickness of Chillesford Beds

1·8 ← Thickness of potentially workable sand and gravel where present, in the Chillesford Beds.

(Thicknesses in metres)

Fig. 6. Map showing the distribution and thickness Chillesford Beds on TM 24

centre. The positions of the other four are given in the description of block H. The remaining ten areas mapped as terrace contain more gravel, are thicker and have a more definite terrace form, with well defined boundaries These are also described under block H.

No boreholes were drilled into the alluvial deposits, which are mapped in the valleys of the Deben, Fynn and Mill Rivers. The deposits mainly consist of silts and muds with occasional gravelly lenses.

COMPOSITION OF THE SAND AND GRAVEL DEPOSITS

There are three potentially workable mineral horizons represented in the sheet area: Glacial Sand and Gravel; Chillesford Beds; and Red Crag. Most of the resources are in the Red Crag and the Glacial Sand and Gravel, the latter being the more gravelly although sand predominates.

Glacial Sand and Gravel

The mean grading of this deposit is fines 4 per cent, sand 82 per cent and gravel 14 per cent. Variation in grain size occurs both laterally, on a regional scale and vertically in each M.A.U. borehole. The sand fraction is predominantly fine to medium in the north of the sheet area, but becomes mainly medium with an increase in the coarse fraction towards the south and east. There is also a tendency for the percentage of the gravel to increase southward (see Fig 7).

The sand fraction of the deposit is mainly quartz, with some flint in the coarse sand range. Moderate iron-staining has produced a predominantly yellow sand, but iron-free silver sand and at the other extreme, deep red iron-rich beds, often cemented to a hard 'iron-pan', also occur.

The gravel fraction is principally made up of brown and black flint, with brown and white quartzite and vein quartz often present in conspicuous amounts. Rarer constituents include chert, sandstone, limestone, metamorphic and igneous rocks. The quartz/quartzite material predominates in the fine fraction of the gravel, and is sub-rounded to rounded, whereas the flint is usually angular or sub-angular and forms most of the coarse gravel.

Seams of grey and brown silt and clay, which may be up to metre thick, are not uncommon.

Chillesford Beds

These deposits consist of interbedded laminated clays and fine silty sands, both usually highly micaceous. Six of the thirteen assessment boreholes proving these beds showed clays overlying silts and sands, four showed clays beneath sands and three revealed sand only. In most boreholes both the clays and sands were pale green in colour, although brown clays, and yellow, brown or red-brown sands have been recorded.

Where the deposit can be classified as mineral, the gravel fraction is always very subordinate, and is sometimes completely absent, for example, at 24 NW 3. Where gravel is present, quartz/quartzite is the main constituent. The mean grading for the mineral of the Chillesford Beds is fines 7 per cent, sand 90 per cent and gravel 3 per cent.

Because the Chillesford Beds are so irregular in their occurrence, and are, in general, rather thin (for details, see Fig. 6) they have been included with the Red Crag for assessment purposes. However, in seven boreholes where the thickness of mineral exceeds 3 ft (0.9 m), separate mean grading results have been given in the borehole records and on the resource map.

The Chillesford Beds are not seen at outcrop nor have they been commercially exploited within the sheet area, although a quarry at Tuddenham St. Martin, approximately $\frac{1}{2}$ mile west of the western sheet boundary, is working them from beneath a cover of Glacial Sand and Gravel.

Red Crag

Of the mineral horizons considered in this report, the Red Crag occupies the largest area and attains the greatest thickness. The weighted mean grading for the deposit is fines 4 per cent, sand 91 per cent and gravel 5 per cent. At most assessment boreholes the mineral is sand, although in the south and west pebbly sand was recorded (see Fig. 8).

The sand fraction is composed principally of well rounded and often polished quartz grains, although in certain beds in the lower (shelly) Crag rounded shell fragments may form a high proportion of the sand. Medium sand is usually predominant, and the coarse sand grade is almost subordinate to the other two grades, although exceptions to these generalisations do occur, for example, at the following boreholes:

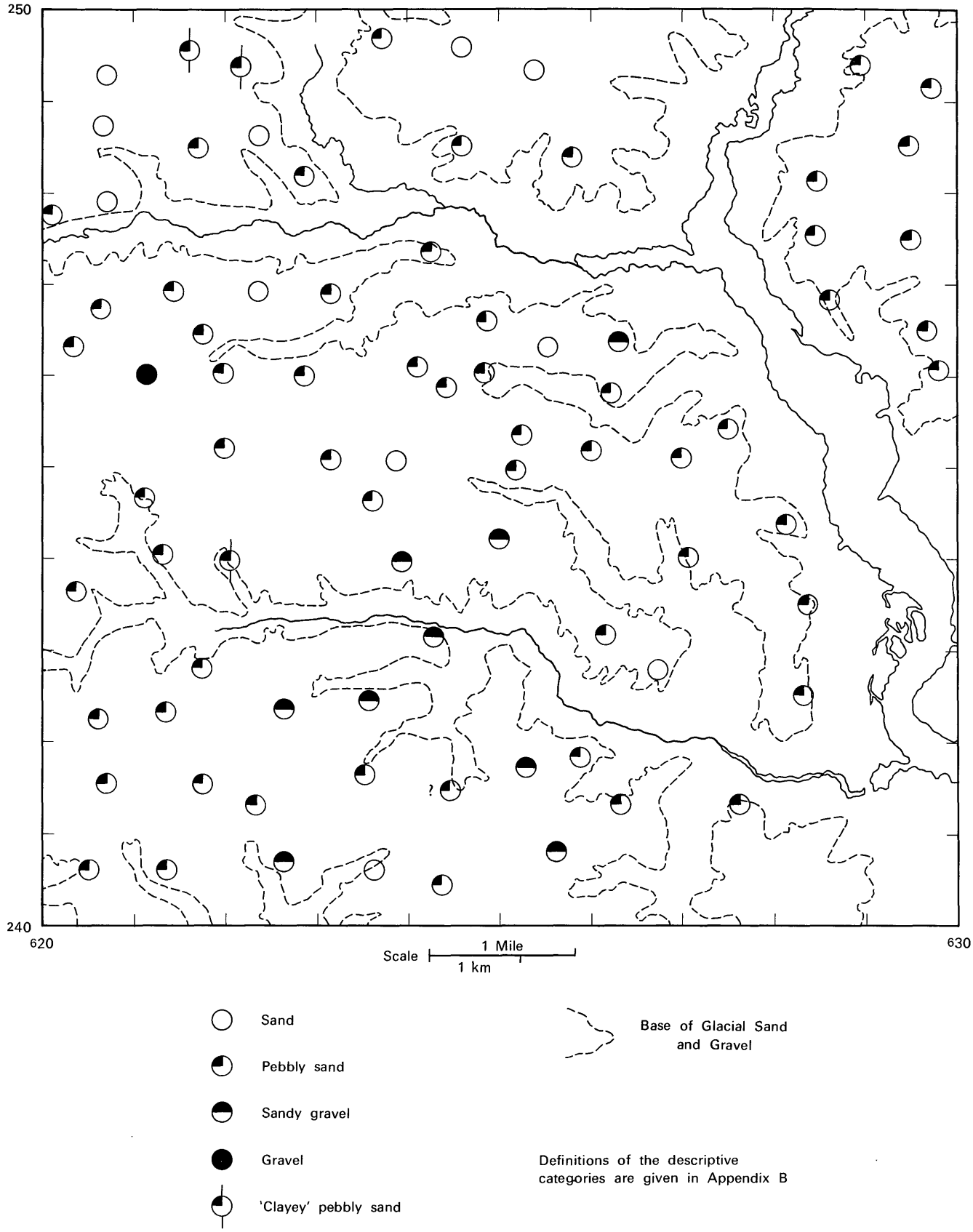


Fig. 7. Grading characteristics of the Glacial Sand and Gravel, based on the mean grading results from eighty-two assessment boreholes

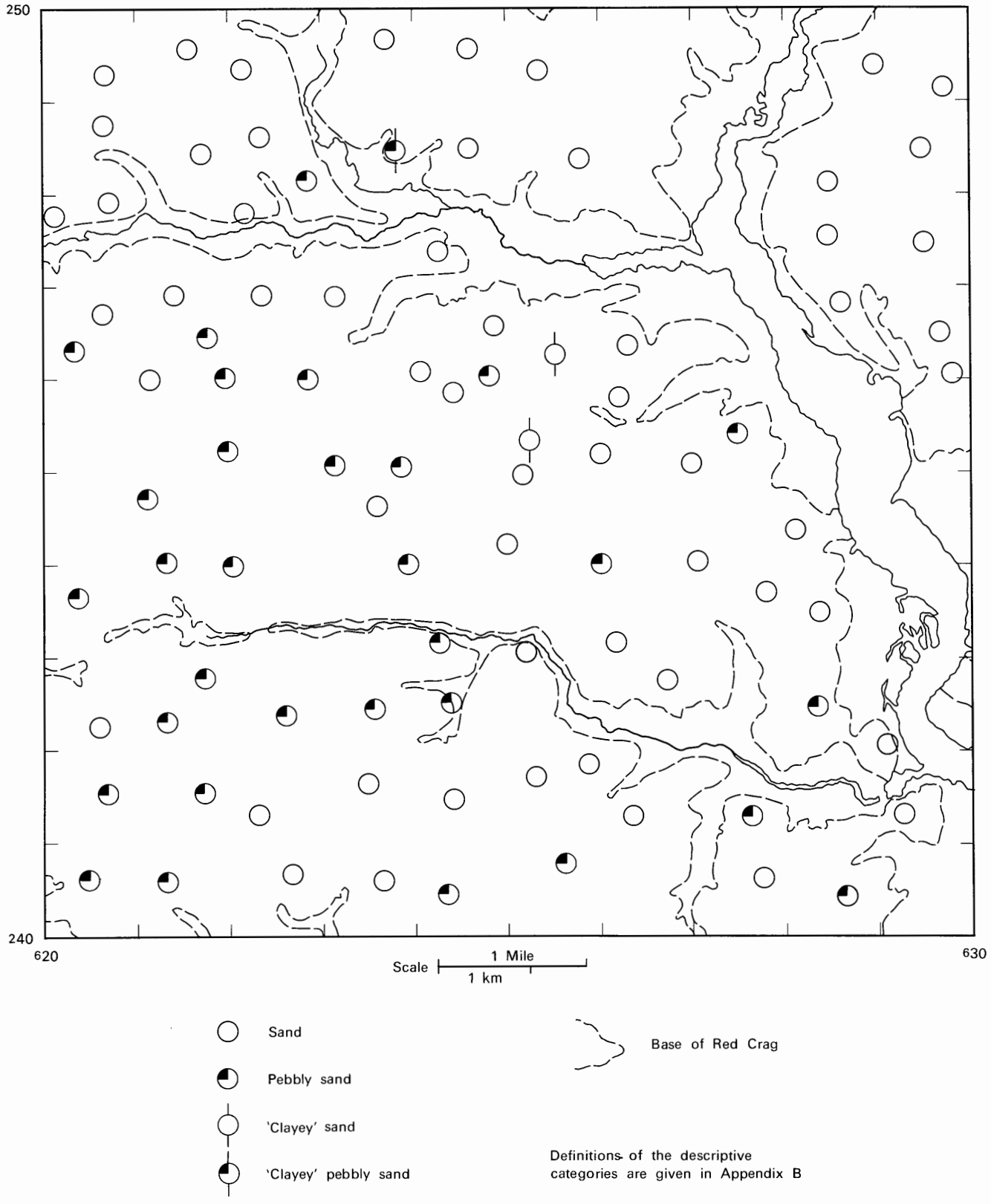


Fig. 8. Grading characteristics of the Red Crag, based on the mean grading results from ninety-two assessment boreholes

Borehole	Grade mm	Fine $+\frac{1}{16}-\frac{1}{4}$	Medium $+\frac{1}{4}-1$	Coarse +1-4
SW 22		44	41	9
SW 23		19	49	28

Figures are given as percentages

Generally the sand becomes coarser towards the south-east. Minerals other than quartz are reported to be rare (see Double, 1924).

The gravel is composed of rounded brown and black flint and quartzite pebbles, (with varying amounts of shell in the lower Red Crag). It does not occur in such discrete beds as in the Glacial Sand and Gravel although there is often a concentration of pebbles at the base. This basal bed contains flint and quartzite pebbles and phosphatic nodules. The last named are brown, up to $2\frac{1}{2}$ in (65 mm) long and include rolled bones, teeth and coprolites they were extracted in the nineteenth century as a source of phosphate fertiliser.

Red Crag is usually brown to reddish-brown in colour. Many patterns are produced by staining by hydrated iron oxides, from simple layering to highly complex concentric rings of brown, red and yellow sand. The iron oxide may be present in sufficient amounts to produce an iron-cemented sandstone, each particle being coated with a layer of purple or black irridescent iron oxide. Silt or clay bands, present in the lower part of the Red Crag, are often indurated with iron oxide to such an extent that a hard 'iron pan' is produced.

The percentage of calcium carbonate (as shell material) in the lower Red Crag varies considerably, both vertically and laterally. Analysis of three samples, after removal of the fines by decantation, gave the following results:

Borehole	Depth (ft)	Per cent $CaCO_3$
SW 13	55-60	3.9
SW 19	49-52	39.5
SW 19	52-55	46.2

According to the Research Department of the Sand and Gravel Association, who performed the analyses at their Wexham Springs laboratory in 1969 (Report No. 150), the deposits represented by the samples are accepted as aggregates for some specifications.

RESULTS

The statistical results are summarised in Tables 2, 3 and 4. Fuller grading particulars are shown in Fig. 9.

Accuracy of Results

For seven of the eight resource blocks on sheet TM 24 the accuracy of the results at the 95 per cent confidence level (that is, the probability that nineteen times out of twenty the true volume present lies within the given limits) varies between 16 per cent and 52 per cent for Glacial Sand and Gravel, 13 per cent and 28 per cent for the Red Crag and 14 per cent and 27 per cent for the mineral as a whole. It should be remembered, however, that the true values are more likely to be nearer the figure estimated than either of the limits. Moreover, it is probable that the roughly the same percentage limits would apply for the estimate of volume of a very much smaller parcel of ground (say, 200 acres) containing similar sand and gravel deposits if the results from the same number of sample points (as provided by, say, ten boreholes) were used in the calculation. Thus, if closer limits are needed for quotation of reserves of part of a block, it can be expected that data from more than ten sample-points are required, even if the area were quite small. This point can be illustrated by considering the whole of the statistically assessed potentially workable sand and gravel on sheet TM 24. The volume (973 million m^3) of this can be estimated to limits of $\pm$ 8 per cent at the 95 per cent confidence level, by a calculation based on the data from as many as ninety-two sample-points spread across the seven resource blocks. The inferred assessments of 5 million m^3 are not included in this total of volume. However, it must again be emphasised that the quoted volume of sand and gravel has no simple relationship with the amount that could be extracted in practice, as no allowance has been made in the calculations for any restraints (such as existing buildings and roads) on the use of the land for mineral working.

NOTES ON RESOURCE BLOCKS

Block A

Approximately 54 per cent (6.5 km^2) of the area of this block is covered with an overburden of Chalky Boulder Clay; it represents the southern edge of the continuous sheet which extends to the north and west and beyond the confines of TM 24. The boulder clay varies in thickness from 5 ft (1.5 m) to 47 ft (14.3 m), the mean value being 26 ft (7.9 m). All assessment boreholes commencing in boulder clay proved the underlying Glacial Sand and Gravel, which crops out over an area of 3.5 km^2 to the south

Table 2. Statistical assessment of the resources of the Glacial Sand and Gravel

Block	Area of mineral	Mean thickness		Volume of mineral				Mean grading percentages					
						Limits at the 95 per cent confidence level		Fines mm	Sand mm			Gravel mm	
	km	m	ft	million m^3	million yd^3	± %	± Volume million m^3	$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}$-1	+1-4	+4-16	+16
A	10.0	4.7	15.4	47	61	27	13	7	36	45	4	5	3
B	5.6	5.8	19.0	32	42	52	17	4	30	49	7	6	4
C	9.6	9.6	31.5	92	120	16	15	5	25	41	11	8	10
D	9.7	5.5	18.0	53	69	28	15	5	28	45	8	8	6
E	9.6	3.4	11.2	33	43	39	13	3	17	43	18	13	6
F	11.2	6.0	19.7	67	88	28	19	1	19	52	14	8	6
G	4.4	3.8	12.5	17	22	45	8	3	14	49	17	12	5
A to G	60.1	5.7	18.7	341	445	12	41						

Table 3. Statistical assessment of the resources of the Red Crag

Block	Area of mineral	Mean thickness		Volume of mineral *				Mean grading pecentages					
						Limits at the 95 per cent confidence level		Fines mm	Sand mm			Gravel mm	
	km^2	m	ft	million m^3	million yd^3	± %	± Volume million m^3	$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1-4	+4-16	+16
A	12.0	8.2	26.9	98	128	21	21	7	41	45	5	2	0
B	7.3	10.6	34.8	77	101	20	15	6	34	49	8	3	0
C	10.6	7.6	24.9	81	106	28	22	3	34	45	11	5	2
D	11.9	9.5	31.2	113	148	13	15	5	32	43	15	3	2
E	13.7	10.5	34.5	144	188	23	33	3	21	54	19	3	0
F	12.6	7.6	24.9	96	126	15	15	2	26	47	17	6	2
G	7.4	4.5	14.8	33	43	19	6	4	26	51	15	3	1
A to G	75.5	8.5	27.9	642	840	9	58						

*Including Chillesford Beds where present as mineral.

Table 4. The sand and gravel resources of sheet TM 24

Statistical Assessment of Sand and Gravel Resources

BLOCK	Area in km^2				Mean thickness				Total volume of mineral*				Mean grading percentages					
	Block	Glacial Sand and Gravel(a)	Red Crag (b)	Total* (a+b)	Over-burden		Total* mineral		million m^3	million yd^3	Limits at the 95 per cent confidence level		Fines	Sand			Gravel	
					m	ft	m	ft			±%	± volume million m^3	$-\frac{1}{16}$ mm	$+\frac{1}{16}-\frac{1}{4}$ mm	$+\frac{1}{4}-1$ mm	+1-4 mm	+4-16 mm	+16 mm
A	12.0	10.0	12.0	22.0	4.0	13.1	6.5	21.3	143	187	18	26	7	39	45	5	3	1
B	7.3	5.6	7.3	12.9	0.2	0.7	8.2	26.9	106	139	24	25	6	32	49	7	4	2
C	10.6	9.6	10.6	20.2	2.2	7.2	8.6	28.2	174	228	14	24	4	29	43	11	7	6
D	11.9	9.7	11.9	21.6	0.4	1.3	7.5	24.6	162	212	15	24	5	30	44	13	5	3
E	13.8	9.6	13.7	23.3	0.5	1.6	7.5	24.6	175	229	27	47	3	21	52	19	4	1
F	12.8	11.2	12.6	23.8	0.3	1.0	6.8	22.3	162	212	14	23	2	23	49	16	7	3
G	7.4	4.4	7.4	11.8	0.6	2.0	4.3	14.1	51	67	18	9	3	22	51	16	6	2
A to G	75.8	60.1	75.5	135.6	0.8	2.6	7.2	23.6	973	1273	8	78						

Inferred Assessment for Deposits (not included in statistical assessment above)

H	15.4	Terrace Sand and Gravel 1.4	unknown	4.0	13.0	c.5	c.7	speculative	unknown
Area not assessed	8.8	Includes the Deben river (4.8 km^2) and the urban area of Woodbridge (4.0 km^2)							

*The estimate of total volume of mineral for each block is not the sum of the estimates of volume of Red Crag and Glacial Sand and Gravel shown in Tables 2 and 3, but was obtained by an independent calculation. For the purpose of this calculation, the Red Crag and overlying Glacial Sand and Gravel are notionally separated and placed side by side to form a single bed of mineral, equal in area to that of the two deposits combined, so that, for example, boreholes which prove both deposits each provide two sample points in the calculation of the mean thickness of total mineral.

of the boulder clay sheet. Red Crag was proved beneath the Glacial Sand and Gravel at all sites, although Chillesford Beds separate the two deposits at six. Red Crag occupies 2.0 km^2 to the south of the Glacial Sand and Gravel outcrop.

The mean thickness of the Glacial Sand and Gravel, as found in boreholes, is $15\frac{1}{2}$ ft (4.7 m), with a range from 6 ft (1.8 m) to 45 ft (13.7 m). At boreholes on the outcrop, the range in thickness is from $12\frac{1}{2}$ ft (3.8 m) to 45 ft (13.7 m) with a mean of $22\frac{1}{2}$ ft (6.8 m) but beneath the boulder clay the range is only from 6 ft (1.8 m) to $20\frac{1}{2}$ ft (6.3 m) with a lower mean of 12 ft (3.6 m), suggesting that the Chalky Boulder Clay may cut out much of the Glacial Sand and Gravel. In fact, thickening of and the downcutting by the boulder clay was formerly well displayed just east of block A, in the Hough Lane sandpit (at 2642 4993), where the section was being obscured by tipping during the survey.

The Chillesford Beds, although not seen at outcrop, were proved in six boreholes: NW 3, 8, 12, 14, 20 and 26. They were doubtfully recorded at NW 25. The beds range in thickness from 3 ft (0.9 m) to 15 ft (4.5 m), the mean being 8 ft (2.5 m).

The combined thickness of the upper and lower parts of the Red Crag varies from 9 ft (2.7 m) to 40 ft (12.2 m), the mean being 27 ft (8.2 m). Individual figures for the two parts are as follows. Non-shelly Red Crag; range 2 ft (0.6 m) to 26.5 ft (8.1 m), mean $17\frac{1}{2}$ ft (5.0 m); shelly Red Crag: range $\frac{1}{3}$ ft (0.1 m) to $28\frac{1}{2}$ ft (8.7 m), mean $10\frac{1}{2}$ ft (3.2 m).

The published geological one-inch map shows an area west of Playford and just north of the Fynn valley, where Glacial Sand and Gravel rests directly on bedrock (London Clay), Red Crag being absent. However, the persistence of Red Crag over the rest of TM 24 suggests that only the lower shelly portion of the Crag is absent here and that the upper (non-shelly) Crag may have been confused lithologically with the often very similar Glacial Sand and Gravel. At borehole NW 4, close to the area in question, the shelly Crag is very thin, $\frac{1}{3}$ ft (0.1 m) thick, although non-shelly Crag was $17\frac{1}{2}$ ft (5.3 m) thick. Boreholes in Glacial Sand and Gravel under boulder clay show a mean grading leading to a classification as sand which is slightly finer in grain size than at borehole sites in the deposit in the block as a whole or at outcrop only, which fall within the pebbly sand classification. The Red Crag in this block is all 'sand' apart from boreholes NW 14 and 21. Mean gradings (given as a percentage) for the block are as follows:

	mm	$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1-4	+4-16	+16
Glacial Sand and Gravel	Under boulder clay	9	41	42	3	3	2
	Outcrop	7	32	47	5	6	3
	All block A	7	36	45	4	5	3
Red Crag		7	41	45	5	2	0
All mineral, block A		7	39	45	5	3	1

The estimate for the volume of Glacial Sand and Gravel is 47 million $m^3 \pm 27$ per cent and for the Red Crag is 98 million $m^3 \pm 21$ per cent, both at 95 per cent probability. The estimate for the total volume of mineral is 143 million $m^3 \pm 18$ per cent.

All limits are given at the 95 per cent confidence level in this Report.

Block B

This block includes all area of Glacial Sand and Gravel and Red Crag east of the Deben. There is no overburden other than thin sandy soil, and even this was absent at four sites (NE 22, 23, 24, and 30). About 78 per cent (5.6 km^2) of the block is occupied by Glacial Sand and Gravel, the Red Crag cropping out as a narrow peripheral band (1.7 km^2 in area) on the west and south. Along most of the Deben shoreline Red Crag can be seen to rest on bedrock (London Clay).

The Glacial Sand and Gravel varies in thickness from 6 ft (1.8 m) to 34 ft (10.4 m) with a mean of 19 ft (5.8 m). In boreholes NE 24 and 27 it is separated from the underlying Red Crag (proved by all assessment boreholes in the block) by Chillesford Beds, which are respectively 12 ft (3.6 m) and 14 ft (4.3 m) thick. The Red Crag as a whole ranges from 23 ft (7.0 m) to $46\frac{1}{2}$ ft (14.1 m) in thickness, with a mean of $30\frac{1}{2}$ ft (9.3 m) the figures for the two component parts are as follows. Non-shelly Red Crag: range 0 to $46\frac{1}{2}$ ft (14.1 m), mean 13 ft (4.0 m); shelly Red Crag: range 0 to $37\frac{1}{2}$ ft (11.5 m), mean $17\frac{1}{2}$ ft (5.3 m).

On the basis of mean grading, the Glacial Sand and Gravel in block B is classified as 'pebbly sand' in each assessment borehole, there being little variation about the mean between one part of the block and another. The Red Crag is classified as 'sand' in each assessment borehole again with little variation between results from the scattered sampling points. The gravel content appears to be remarkably constant: at six sites the mean gravel percentage is 3 per cent, the exceptions being NE 29, where it is 2 per cent and NE 27 where it is 4 per cent.

Mean gradings (given in percentages) for the block are given below.

The estimate for the volume of Glacial Sand and Gravel is 32 million $m^3 \pm 52$ per cent, and for the Red Crag is 77 million $m^3 \pm 20$ per cent. The estimate for the total volume of mineral is 106 million $m^3 \pm 24$ per cent.

The large variation in thickness values of Glacial Sand and Gravel revealed by a small number of sample points results in wider tolerances at the 95 per cent confidence level than might be expected. The variation in thickness is primarily the result of post-Glacial erosion of the exposed sheet of sand and gravel, whose surface was probably originally planar and unprotected by later deposits. In several cases, glacial heaving and possibly tectonic movements appear to have disturbed the deposits prior to erosion, with the result that more material was removed at these places than where this did not occur. The Red Crag was protected from erosion by the overlying beds, and estimates of total volume at the stated confidence limits lie within narrower limits than those for the Glacial Sand and Gravel.

Block C

An area of 0.9 km^2 of Chalky Boulder Clay, elongated approximately 2 km east and west, occurs to the north-east of Rushmere St Andrew and three assessment boreholes, NW 5, 9 and 16, proved thicknesses of 23 ft (7.0 m) 27 ft (8.2 m) and 15 ft (4.6 m) respectively. Borehole NW 16 is just south of the boulder clay area as mapped. At all other boreholes in the block, the only overburden is sandy soil. Glacial Sand and Gravel was proved beneath boulder clay at the three sites mentioned above and showed consistent thicknesses of, respectively, 35 ft (10.7 m),

mm	$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1-4	+4-16	+16
Glacial Sand and Gravel	4	30	49	7	6	4
Red Crag	6	34	49	8	3	0
Total mineral, block B	6	32	49	7	4	2

33 ft (10.1 m) and 32½ (10.0 m). Over the block a a whole, however, the thickness of Glacial Sand and Gravel ranges from 18 ft (5.5 m) to 44 ft (13.4 m), with a mean of 31½ ft (9.6 m). Red Crag was proved beneath the glacial deposits in all boreholes, and Chillesford Beds were not encountered in this block

The combined thickness of the shelly and non-shelly Red Crag varies from 6½ ft (2.0 m) to 40 ft (12.2 m), with a mean of 25 ft (7.6 m). Figures for the sub-divisions are as follows. Non-shelly Red Crag; range 0 to 34 ft (10.4 m), mean 9½ ft (2.9 m); shelly Red Crag: range 0 to 28 ft (8.5 m), mean 15½ ft (4.7 m). The upper (non-shelly) division is absent at two adjacent sites, NW 11 and 18, where the glacial deposits were proved to a lower level above O.D. than elsewhere in the block. The lower parts of the glacial material are unusually coarse; for example, the lower 5 ft (1.5 m) at NW 11 showed 72 per cent gravel, the highest figure recorded on the present sheet area. The most likely explanation is that a fluvio-glacial channel carried floodwaters across this part of the area, which eroded the non-shelly Crag (and probably part of the shelly Crag, and deposited unusually coarse material along the channel. The exact form and extent of this feature cannot be determined on present limited evidence.

In most assessment boreholes in block C, the mean grading of the mineral indicates that the Glacial Sand and Gravel is 'pebbly sand', the gravel fraction ranging from 11 per cent to 23 per cent. Exceptions occur at NW 16 where the deposits are sand, and at NW 11 where the mean grading shows 55 per cent gravel, the highest mean gravel percentage recorded in this sheet area. The Red Crag is 'pebbly sand' in boreholes in the southern half of the block and around Kesgrave, and 'sand' elsewhere. Mean percentage gradings for the block are given below.

The estimate for the volume of Glacial Sand and Gravel is 92 million m^3 ± 16 per cent and for the Red Crag is 81 million m^3 ± 28 per cent. The estimate for the total volume of mineral is 174 million m^3 ± 14 per cent.

Block D

Apart from a small area of boulder clay mapped near Dobb's Corner [238 453], approximately 82 per cent (9.7 km^2) of block D is occupied by the outcrop of Glacial Sand and Gravel. The remaining 18 per cent (2.2 km^2) is occupied by Red Crag which crops out as a narrow band on the north and south of the Glacial Sand and Gravel and in the upper reaches of the minor valley draining eastward directly to the Deben. Chillesford Beds were not encountered in this block, but Red Crag was proved beneath the Glacial Sand and Gravel in all assessment boreholes.

The Glacial Sand and Gravel ranges from 8 ft (2.4 m) to 36 ft (11 m) in thickness, the mean being 18 ft (5.5 m). The combined thickness of Red Crag varies from 18 ft (5.5 m) to 42 ft (12.8 m), with a mean of 31½ ft (9.5 m). Figures for the two parts of the Red Crag are as follows. Non-shelly Red Crag: range from 0 to 31½ ft (9.5 m), mean 16½ ft (5.0 m); there was a zero value at one site only, otherwise the range is 8½ ft (2.5 m) to 31½ ft (9.5 m). Shelly Red Crag: range 0 to 29½ ft (9.2 m), mean 16 ft (4.8 m); zero value at one site only, otherwise range is 4 ft (1.2 m) to 29½ ft (9.2 m).

The London Clay in this block is believed to have been affected locally by superficial glacial disturbances and/or tectonic movements, but downwarping of the London Clay has been more important here than in block B with the result that more Glacial Sand and Gravel has been left after post-glacial erosion than would otherwise have been the case. This is the reverse of the situation in block B.

Over most of the block, the mean grading of the Glacial Sand and Gravel at individual boreholes indicates a classification as 'pebbly

mm	$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1-4	+4-16	+16
Glacial Sand and Gravel	5	25	41	11	8	10
Red Crag	3	34	45	11	5	2
Total mineral, block C	4	29	43	11	7	6

mm	$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1 -4	+ 4-16	+ 16
Glacial Sand and Gravel	5	28	45	8	8	6
Red Crag	5	32	43	15	3	2
Total mineral block D	5	30	44	13	5	3

sand', although a small area extending from Beaconhill House [245 473] to Dobb's Corner and eastward to include the area around Sandy Lane [255 465] is 'sand'. In the eastern two-thirds of the block the Red Crag at individual sites is classified as sand, in the western third (see Fig. 8) as 'pebbly sand'. The mean percentage gradings for the block as a whole are given above.

The estimate for the volume of Glacial Sand and Gravel is 53 million m^3 ± 28 per cent and for the Red Crag is 113 million m^3 ± 13 per cent. The estimate for the total volume of mineral is 162 million m^3 ± 15 per cent.

Block E

The boundaries of this block have been drawn to include the thick Crag occupying the Newbourn basin (see Figs. 2 and 3). The outcrop of the Glacial Sand and Gravel occupies about 74 per cent (9.6 km^2) of block E. The outcrop of Red Crag representing about 25 per cent (4.1 km^2), of block E is a band bordered by the London Clay outcrop along the Mill River and its tributaries, and on the Deben estuary between Rivers Hall and White Hall. Approximately 1 per cent (0.1 km^2) of the block is exposed London Clay. Red Crag was proved in all boreholes and in two, SE 13 and SW 29; $14\frac{1}{2}$ ft (4.5 m) and 21 ft (6.4 m) respectively of Chillesford Beds were also proved.

The Glacial Sand and Gravel ranges in thickness, from 3 ft (0.9 m) to 27 ft (8.2 m), with a mean of 11 ft (3.4 m). The Red Crag as a whole varies from 7 ft (2.1 m) to 63 ft (19.2 m), with a mean of $34\frac{1}{2}$ ft (10.5 m); figures for the two parts are as follows: non-shelly Red Crag; range $4\frac{1}{2}$ ft (1.3 m) 30 ft (9.1 m), mean 18 ft (5.5 m); shelly Red Crag: range 3 ft (0.9 m) to $40\frac{1}{2}$ ft (12.2 m), mean 17 ft (5.0 m).

This is the highest mean thickness for the Crag as a whole in any resource block in TM 24, embracing the highest mean value for the non-shelly Crag and the second highest value for the shelly Crag in any block. The thickness of 63 ft (19.2 m) recorded for the Red Crag at SE 15 is the maximum thickness for this formation in the area covered by TM 24. In the case of the shelly Crag the thickest deposits occur around Newbourn, where the London Clay surface is at its lowest, near the centre of what may be regarded as a basin of deposition.

At most assessment borehole sites the Glacial Sand and Gravel falls within the 'pebbly sand' class, apart from site SE 14 which is sandy gravel, The Red Crag grades as 'sand' over much of the block, but at five sites, SW 24, 28 and 30, and SE 8 and 14 it is pebbly sand. Mean percentage grading for the block are:

mm	$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+ 1-4	+ 4-16	+16
Glacial Sand and Gravel	3	17	43	18	13	6
Red Crag	3	21	54	19	3	0
Total mineral for block E	3	21	52	19	4	1

The estimate for the volume of Glacial Sand and Gravel is 33 million m^3 ± 39 per cent and for the Red Crag is 144 million m^3 ± 23 per cent. The estimate for the total volume of mineral is 175 million m^3 ± 27 per cent.

Block F

Approximately 11.2 km^2 of the area of this block is occupied by Glacial Sand and Gravel and 1.4 km^2 by Red Crag, the latter cropping out as a narrow strip south of the Mill River, and also in the Nacton and Levington areas. The Red Crag was proved beneath Glacial Sand and Gravel in all assessment boreholes; at SW 18 and 19 the two deposits are separated by Chillesford Beds, respectively 3 ft (1.0 m) and 6 ft (1.8 m) in thickness. Overburden is restricted to sandy soil with a mean thickness of 1 ft (0.3 m).

The Glacial Sand and Gravel ranges from 5 ft (1.5 m) to 36 ft (11 m), the mean thickness being 19½ ft (6.0 m). The Red Crag as a whole ranges from 18 ft (5.5 m) to 37 ft (11.3 m) with a mean thickness of 25 ft (7.6 m); the figures for the two parts are as follows. Non-shelly Red Crag: range 3 ft (0.9 m) to 27 ft (8.2 m), mean 14 ft (4.3 m); shelly Red Crag: range 3 ft (0.9 m) to 29 ft (5.8 m), mean 10 ft (3.3 m).

Of the thirteen assessment boreholes proving Glacial Sand and Gravel, ten showed mean gradings indicating a pebbly sand classification, two showed 'sandy gravel' and one, 'sand'. For the Red Crag the corresponding figures are, eight sites showing 'pebbly sand' and five, 'sand'. The mean percentage grading for the block are given below. The estimate for the volume of Glacial Sand and Gravel is 67 million m^3 ± 28 per cent and for the Red Crag is 96 million m^3 ± 15 per cent. The estimate for the total volume of mineral is 162 million m^3 ± 14 per cent.

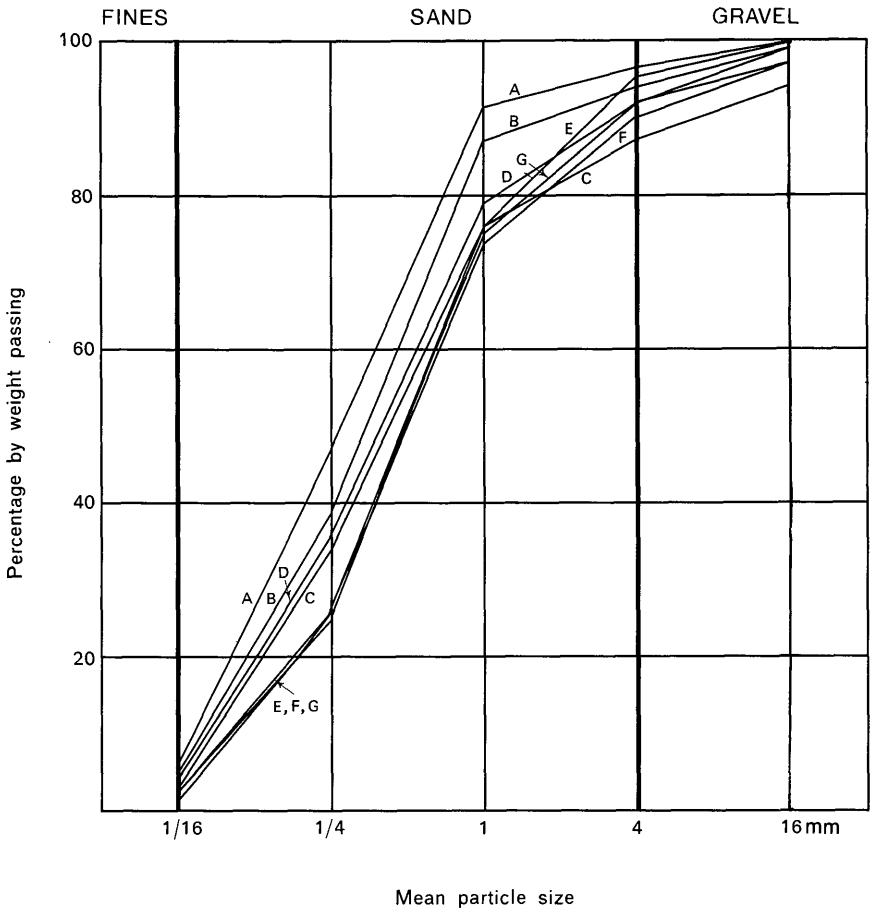
Block G

This block comprises four separate areas where the geological characteristics of the Red Crag are consistent. About 60 per cent (4.4 km^2) of this block is occupied by the outcrop of the Glacial Sand and Gravel, the remaining 40 per cent (3.0 km^2) by Red Crag, which forms a band flanking the London Clay outcrop along the Deben estuary, (the junction between the two being frequently well displayed) and along the Mill River and its tributaries. The areas around Nursery Woods and east of Hemley Farm, in the south-east of the block, are mapped as River Terrace Gravel (resting upon either London Clay or Red Crag, partly bordered by Alluvium). However, assessment boreholes SE 26 and 27 proved stoneless red silts and fine sands, and the deposits in both areas are therefore considered to belong to the upper (non-shelly) part of the Red Crag rather than to terrace deposits. The absence of lower shelly Red Crag here may be explained by the proximity of a pre-Red Crag swell in the surface of the London Clay. Shelly Crag is similarly absent at SE 22, near the axis of the same structure, within the area covered by Red Crag. Chillesford Beds are doubtfully recorded at SE 25.

The Glacial Sand and Gravel ranges in thickness from 6 ft (1.8 m) to 21 ft (6.4 m), with a mean of 12½ ft (3.8 m) and for Red Crag as a whole from 5 ft (1.5 m) to 18 ft (5.5 m), the mean being 14½ ft (4.5 m). Figures for the two parts are as follows. Non-shelly Red Crag: range 2ft (0.6 m) to 18 ft (5.5 m), mean 10½ ft (3.2 m); shelly Red Crag: range 0 to 15 ft (4.6 m), mean 4½ ft (1.4 m)

All assessment boreholes proving Glacial Sand and Gravel have a mean grading figure indicating a classification as 'pebbly sand', apart from NE 15, which was sandy gravel.

mm	$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1-4	+4-16	+16
Glacial Sand and Gravel	1	19	52	14	8	6
Red Crag	2	26	47	17	6	2
Total mineral, block F	2	23	49	16	7	3



BLOCK	Percentage by weight passing				
	1/16mm	1/4mm	1mm	4mm	16mm
A	7	46	91	96	99
B	6	38	87	94	98
C	4	33	76	87	94
D	5	35	79	92	97
E	3	24	76	95	99
F	2	25	74	90	97
G	3	25	76	92	98

Fig. 9. Particle size distribution for the assessed thickness of mineral in the resource blocks A to G

mm	- 1/16	+ 1/16 - 1/4	+ 1/4 - 1	+ 1-4	+4-16	+16
Glacial Sand and Gravel	3	14	49	17	12	5
Red Crag	4	26	51	15	3	1
Total mineral, block G	3	22	51	16	6	2

Mean gradings (given as a percentage) for the block are given above.

The estimate for the volume of Glacial Sand and Gravel is 17 million m^3 ± 45 per cent for the Red Crag is 33 million m^3 ± 19 per cent and for the total volume of mineral 51 million m^3 ± 18 per cent.

Block H

The block covers an area of 15.4 km^2 of which 1.4 km^2 is mineral bearing (terrace sand and gravel). The remaining 14.0 km^2 is London Clay, alluvium and non-mineral bearing terrace deposits. Field investigations showed that five of the mapped terrace deposits outside the urban area of Woodbridge are very thin and are composed of clay and silt, containing little or no potentially workable sand and gravel. They have therefore been excluded from the assessment. Four of the terraces are on the west bank of the River Deben, north and east of Hill Farm [2684 4654], immediately north of Waldringfield, north-east and south-east of Hemley Hall [2838 4300], and one on the east bank of the River Deben north of Sutton Hoo.

The remaining ten areas of terrace for which an inferred assessment has been made contain mineral of variable thickness and gravel content. The greatest thickness was proved by site investigation boreholes in the terrace north-east of Martlesham Creek [255 475] with a mean of 20 ft (6.0 m). This terrace contains up to 44 per cent gravel in the upper part of the deposit, but becomes more sandy with an increase in the fines towards the base. A similar pattern of gravel overlying a more sandy deposit is seen in the terrace south and west of Martlesham [250 472] The two terraces classed as mineral on the east bank of the Deben are thought to be similar in character to those in the valley of the River Fynn.

The four small areas of mineral-bearing terrace deposits on the west bank of the Deben, south of Martlesham Creek, are thought to be thinner than the terraces described above and are mainly composed of silty sand with a little gravel.

Alluvium occupies the floor of the valleys of the River Fynn and Mill River and the lower slopes and saltings of the Deben valley. It consists of silts and clays with occasional sandy lenses and contains no potentially workable sand and gravel, although there may be sub-alluvial extensions of the terraces in some areas.

An inferred assessment of the total mineral in block H has been made giving a volume estimate of 5 million m^3. No confidence limits can be quoted.

LIST OF QUARRIES

In May 1971 there were two active sand and gravel quarries.

Working quarries	Horizons worked	Grid Reference
Kesgrave	Glacial Sand and Gravel and Red Crag	235 465
Waldringfield Heath	"	235 447
Abandoned quarries		
Hough Lane	Glacial Sand and Gravel	267 498
Dukes' Hill Wood	Glacial Sand and Gravel and Red Crag	239 439

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Appendix A: Assessment Procedure

1. Within a resource block, a statistical assessment is made for a sampled area of mineral greater than 2 km^2 and containing a minimum of five evenly-spaced boreholes.

2. If the sampled area of mineral is between 0.25 and 2 km^2 and contains one or two suitably sited boreholes an inferred assessment is made. An inferred assessment may also be attempted for any area where the deduced mineral content is small and which consequently has not been sampled by boreholes. No specific level of accuracy is claimed for such subjective assessments.

3. No assessment is attempted for an area of mineral less than 0.25 km^2.

Statistical Assessment

4. The simple methods used in the calculations are consistent with the amount of data provided by the survey. Conventional confidence limits (that is, the tolerance on the estimate or the range within which the result falls) are calculated at the two-sided 95 per cent confidence level, that is, there is a $2\frac{1}{2}$ per cent or 1 in 40 chance that the result exceeds the stated upper limited and a corresponding $2\frac{1}{2}$ per cent chance that it is less than the stated lower limit.

5. The volume estimate (V) for the sampled mineral in a given block is the product of the two variables, the sampled areas (A) and the mean thickness ($\bar{1}$) calculated from the individual thicknesses at the sample points. The standard deviations for these variables are related such that

$$S_V = \sqrt{S_A^2 + S_{\bar{1}}^2} \quad \ldots\ldots\ldots\ldots (1)$$

where S_V, S_A and $S_{\bar{1}}$ are the standard deviations for volume, area and mean thickness, expressed as proportions of V, A and $\bar{1}$, respectively.

6. The above relationship may be transposed such that

$$S_V = S_{\bar{1}} \sqrt{\left[1 + \left(\frac{S_A^2}{S_{\bar{1}}}\right)\right]} \quad \ldots\ldots\ldots\ldots (2)$$

From this it can be seen that as $\left(\frac{S_A}{S_{\bar{1}}}\right)$ tends to 0, S_V tends to $S_{\bar{1}}$. If, therefore, the standard deviation for area is small with respect to that for mean thickness, the standard deviation for volume approximates to that for mean thickness.

7. Given that the number of approximately evenly spaced sample points in the sampled area is n, with mineral thickness measurements 1_1, 1_2, ... 1_n, then the best estimate of mean thickness, $\bar{1}$ =

$$\frac{\sum(1_1 + 1_2 \ldots 1_n)}{n}$$

For groups of closely spaced boreholes a discretionary weighting factor may be applied to avoid bias (see note on weighting below). The standard deviation for mean thickness, $S_{\bar{1}}$ expressed as a proportion of the mean thickness is given by

$$S_{\bar{1}} = \frac{1}{\bar{1}} \sqrt{\frac{\sum(1 - \bar{1})^2}{n\,(n - 1)}}$$ where 1 is any value in the series 1_1 to 1_n.

8. The sampled area A in each resource block is coloured pink on the map. Wherever possible, calculations relate to the mineral within mapped geological boundaries (which may not necessarily correspond to the limits of a deposit). Generally, therefore, the only error in determining the area is the negligible planimetering error and S_A is 0. Where the area is not defined by a mapped boundary, that is, where the boundary is inferred (and the distinctive symbol is used), experience suggests that S_A is small relative to $S_{\bar{1}}$.

The relationship

$$\frac{S_A}{S_{\bar{1}}} \leqslant \frac{1}{3}$$ is assumed in all cases.

It follows from equation (2) that

$$S_{\bar{1}} \leqslant S_V \leqslant 1.05\, S_{\bar{1}} \quad \ldots\ldots\ldots\ldots (3)$$

9. The two-sided 95 per cent confidence limits, $L_{\bar{1}}$, for the estimate of mean thickness of mineral in the sampled area, for values of n between 5 and 20, may be expressed in absolute units

$$\bar{1} \pm (t \times S_{\bar{1}} \times \bar{1}),$$

or as a percentage

$$\bar{1} \pm (t \times S_{\bar{1}} \times 100) \text{ per cent}$$

where t is Student's t at the two-sided 95 per cent confidence level for (n - 1) degrees of freedom and is evaluated by reference to statistical tables. In applying Student's t it is assumed that the measurements are distributed normally.

10. Values of t at the two-sided 95 per cent confidence level for values of n up to 20 are set out below:

n	t	n	t
1	∞	11	2.228
2	12.706	12	2.201
3	4.303	13	2.179
4	3.182	14	2.160
5	2.776	15	2.145
6	2.571	16	2.131
7	2.447	17	2.120
8	2.365	18	2.110
9	2.306	19	2.101
10	2.262	20	2.093

(From Table 12, Biometrika Tables for Statisticians, Volume 1, Second Ed. Cambridge University Press, 1962).

The value of t, 1.96, when n is infinity is used when n is greater than 20.

11. In calculating the two-sided 95 per cent confidence limits for volume, L_V, the following inequality corresponding to (3) is applied:

$$L_{\bar{I}} \leqslant L_V \leqslant 1.05\ L_{\bar{I}}$$

12. In summary, for values of n between 5 and 20, L_V is calculated as

$$\frac{1.05 \times t}{\bar{I}} \times \sqrt{\frac{\sum(I - \bar{I})^2}{n\,(n-1)}} \times 100 \text{ per cent}$$

and when n is greater than 20, as

$$\frac{1.05 \times 1.96}{\bar{I}} \times \sqrt{\frac{\sum(I - \bar{I})^2}{n\,(n-1)}} \times 100 \text{ per cent}$$

13. An illustration of the procedures outlined above is given in Figs. 10 and 11, where a volume estimate with confidence limits at the 95 per cent level of confidence is derived from fictitious data.

Inferred Assessments

14. If the sampled area of mineral in a resource block is between 0.25 km^2 and 2 km^2 an assessment is inferred based on geological and topographical information usually supported by the data from one or two suitably sited boreholes. The volume of mineral is calculated as the product of the sampled area, chosen from interpretation of field data as in the statistical assessment, and the judged average mineral thickness. Confidence limits are not calculated.

15. In some cases in addition to the sampled area of mineral a resource block includes an area left uncoloured on the map, generally based on interpretation of mapping and sample data. On occasions some mineral may be present in such areas and an assessment is made on the basis of the average mineral thickness deduced from exposures and any other evidence available.

Note on Weighting

16. The thickness of a deposit at any point in a sampled area may be governed solely by the position of the point in relation to a broad trend. However, most sand and gravel deposits in addition exhibit a random pattern of local, and sometimes considerable, variation in thickness.

17. Thus, in estimating mean thickness of sand and gravel from a number of data points in a sampled area only the use of simple weighting factors is justified, and the distribution of data points need be only approximately regular. In practice, equal weighting can often be applied to thicknesses at all data points within the sampled area. If, however, there is a distinctly unequal distribution of points, the thicknesses must be weighted to avoid the bias this creates. Weighting factors are determined by first dividing the sampled area into broad zones, to each of which a value roughly proportional to its area is assigned. This value is then shared between the data points within the zone.

Appendix B: Classification and Description of Sand and Gravel

The terminology commonly used by geologists when describing sedimentary rocks (Wentworth, 1922) is not entirely satisfactory for the purposes of this Report. For example, Wentworth proposed that a deposit should be described as a 'gravelly sand' when the proportion of sand is greater than that of gravel which must exceed 10 per cent, fines and oversize materials (that is, with diameter greater than 64 mm) being less than 10 per cent. Because deposits containing more than 10 per cent fines (material less than 1/16 mm) are not embraced by this system a modified binary classification based on Willman (1942) has been adopted.

For the purposes of assessing resources of sand and gravel a classification should take account of economically important characteristics of the deposit, in particular the absolute content of fines and the ratio of sand to gravel.

When the fines content exceeds 40 per cent the material is considered to be not potentially workable and falls outside the definition of mineral. Deposits which contain less than 40 per cent fines are classified primarily on the ratio of sand to gravel and qualified in the light of the fines content, as follows: 0 to 10 per cent fines—no qualification; 10 to 20 per cent fines—'clayey'; 20 to 40 per cent fines—'very clayey'.

The term 'clay' (as written, with single quote marks), is used to describe all material passing

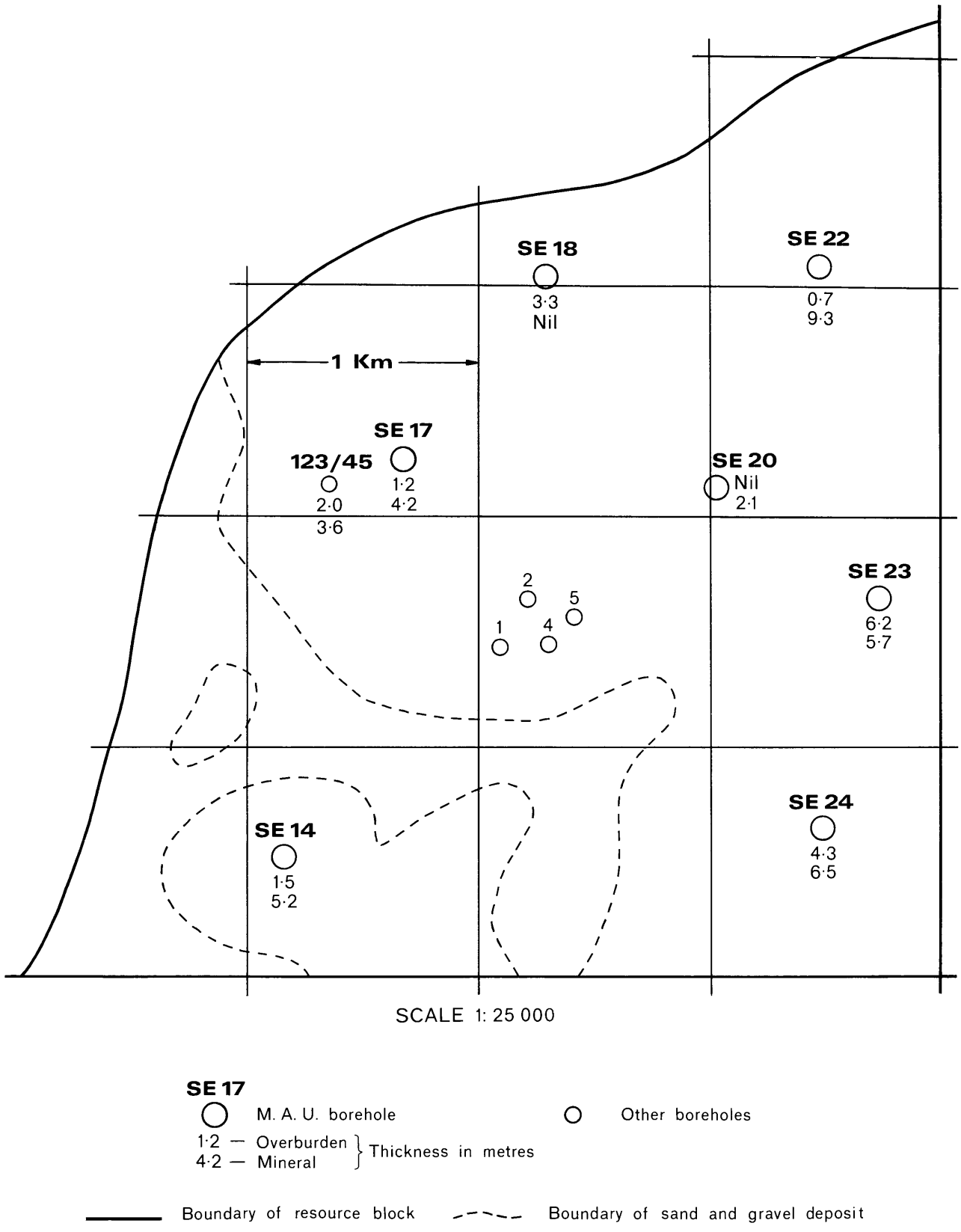


Fig. 10. Example of resource block assessment: map of fictitious block

1/16 mm. Thus it has no mineralogical significance and includes particles falling within the size limits of silt. Wherever the term clay does not appear in single quotation marks the normal meaning applies.

The ratio of sand to gravel defines the boundaries between Sand, Pebbly Sand, Sandy Gravel and Gravel (at 19:1, 3:1 and 1:1).

Thus it is possible to classify the mineral into one of twelve descriptive categories (see Fig.9).

BLOCK CALCULATION

1:25 000 Sheet } Fictitious
Block }

Area

Block: 11.08 km^2
Mineral: 8.32 km^2

Thickness

Overburden: 2.5 m
Mineral: 4.5 m

Volume

Overburden: 21 million m^3
Mineral: 38 million m^3

95 per cent confidence limits of the estimate of mineral volume

Percentage: ± 53 per cent
Units of volume: ± 20 million m^3

Thickness estimate (l = thickness)
Measurements in metres

Sample point	Weighting w	Overburden lo	Overburden wlo	Mineral lm	Mineral wlm	Remarks
SE 14	1	1.5	1.5	5.2	5.2	MAU Boreholes
SE 18	1	3.3	3.3	nil	-	
SE 20	1	nil	-	2.1	2.1	
SE 22	1	0.7	0.7	9.3	9.3	
SE 23	1	6.2	6.2	5.7	5.7	
SE 24	1	4.3	4.3	6.5	6.5	
SE 17	½	1.2	1.6	4.2	3.9	
123/45	½	2.0		3.6		Hydrogeol. Dept. record
1	¼	2.4	2.5(25)*	3.4	3.6(25)*	Close group of four boreholes (commercial)
2	¼	4.5		0.8		
4	¼	0.4		4.3		
5	¼	2.8		6.0		
Totals	∑w = 8	∑wlo = 20.1(25)*		∑wlm = 36.3(25)*		
Averages		$\bar{l}o$ = 2.5(16)*		$\bar{l}m$ = 4.5(41)*		

Calculation of Confidence Limits

l	$(l - \bar{l})$	$(l - \bar{l})^2$
5.2	0.7	0.49
nil	4.5	20.25
2.1	2.4	5.76
9.3	4.8	23.04
5.7	1.2	1.44
6.5	2.0	4.00
3.9	0.6	0.36
3.6	0.9	0.81
∑l = 36.3 (25)	$\sum(l - \bar{l})^2$ = 56.15	
n = 8		
$\bar{l}$ = 4.5 (41)		
≃ 4.5		

n = 8
t = 2.365

$$L_V = 1.05 \frac{t}{\bar{l}} \sqrt{\frac{\sum(l - \bar{l})^2}{n(n-1)}} \times 100$$

$$= 1.05 \times \frac{2.365}{4.541} \sqrt{\frac{56.15}{8 \times 7}} \times 100$$

= 54.77

≃ 55%

* The figures in brackets are additional decimal places used only in the calculation of confidence limits.

Fig. 11. Example of resource block assessment: statement and calculation

The procedure is as follows.

1. Classify according to ratio of sand to gravel.
2. Describe fines.

For example, a deposit grading: gravel, 11 per cent; sand, 70 per cent; fines, 19 per cent is classified as 'clayey' pebbly sand. This short description is included in the borehole log (see Note 10, p.35).

Many differing proposals exist for the classification of the grain size of sediments (Atterberg, 1905; Udden, 1914; Wentworth, 1922; Wentworth, 1935; Allen, 1936; Twenhofel, 1937; Lane and others, 1947). As Archer (1970) has emphasised, there is a pressing need for a simple metric scale acceptable to both scientific and engineering interests, for which the class limit sizes correspond closely with certain marked changes in the natural properties of mineral particles. For example, there is an important change in the degree of cohesion between particles at about the 1/16 mm size, which approximates to the generally accepted boundary between silt and sand. In this and other respects the system shown in Table 5, used in this report, is satisfactory. It is based on Udden's geometric scale and a simplified form of Wentworth's terminology.

The fairly wide intervals in the scale are consistent with the general level of accuracy of the quantitative assessments of the resource blocks. Three sizes of sand are recognised, fine (-¼ + 1/16 mm), medium (-1 + ¼ mm) and coarse (-4 +1 mm). The boundary at 16 mm distinguishes a range of finer gravel (-16 + 4 mm), often characterised by abundance of worn tough pebbles of vein quartz, from coarser ranges often of notably different average composition. The boundary at 64 mm distinguishes pebbles from cobbles. The term 'gravel' is used loosely to denote both pebble-sized and cobble-sized material.

The size distribution of borehole samples is determined by sieve analysis, and is presented by the laboratory as logarithmic cumulative curves (see, for example, British Standard 1377:67). In this report the grading is tabulated on the borehole record sheets (Appendix C), the intercepts corresponding with the simple geometric scale 1/16 mm, ¼ mm, 1 mm, 4 mm, 16 mm, and so on as required. Original sample grading curves are available for reference at the appropriate office of the Institute.

Each bulk sample is described, subjectively, by a geologist at the borehole site. Being based on visual examination, the description of the grading is inexact, the accuracy depending on the experience of the observer. The descriptions recorded are modified, as necessary, when the laboratory results become available for inclusion in Appendix C.

The relative proportions of the rock types present in the gravel fraction are indicated by use of the words 'and' or 'with'. For example, 'flint and quartz' indicates very approximate equal proportions with neither constituent accounting for less than about 25 per cent of the whole; 'flint with quartz' indicates that flint is dominant and quartz, the accessory rock type, comprises 5 to 25 per cent of the whole. Where the accessory material accounts for less than 5 per cent of the whole, but is still readily apparent, the phrase 'with some' has been used. Rare constituents are referred to as 'trace'.

Table 5. Classification of gravel, sand and fines

Size limits	Designation	Qualification	Primary classification
64 mm	Cobble		Gravel
16 mm	Pebble	Coarse	
		Fine	
4 mm	Sand	Coarse	Sand
1 mm		Medium	
¼ mm		Fine	
1/16 mm	Fines (silt and clay)		Fines

The terms used in the field to describe the degree of rounding of particles—which is concerned with the sharpness of the edges and corners of a clastic fragment and not the shape—(after Pettijohn, 1957) are as follows.

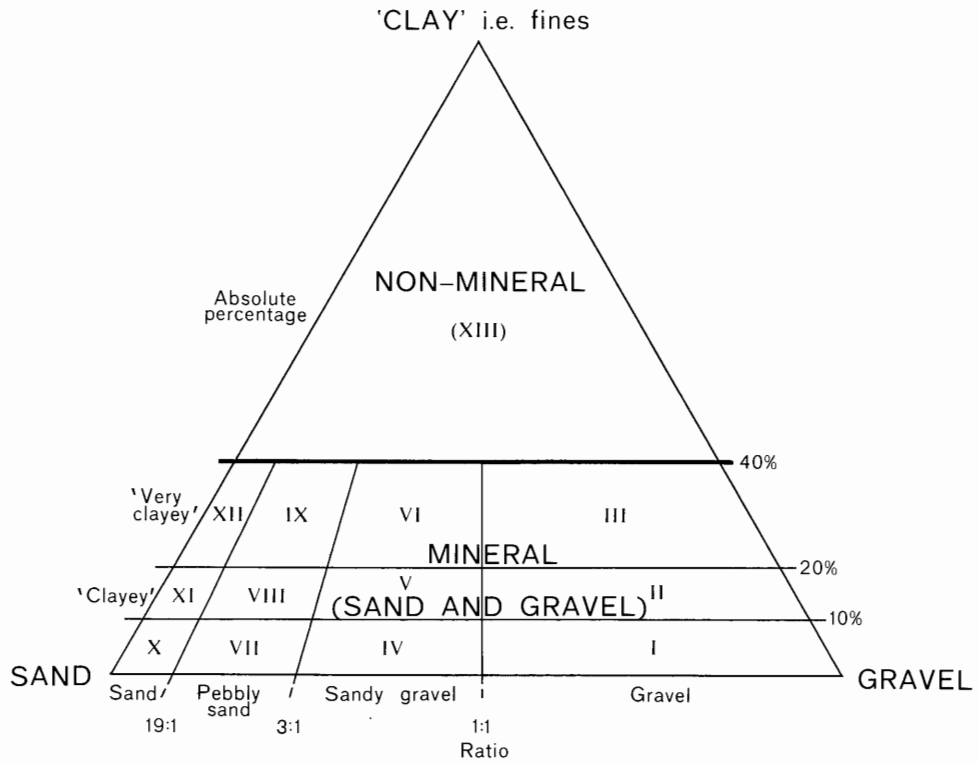
Angular: showing little or no evidence of wear; sharp edges and corners.

Subangular: showing definite effects of wear. Fragments still have their original form but edges and corners begin to be rounded off.

Subrounded: showing considerable wear. The edges and corners are rounded off to smooth curves. Original grain shape is still distinct.

Rounded: original faces almost completely destroyed, but some comparatively flat surfaces may still remain. All original edges and corners have been smoothed off to rather broad curves. Original shape is still apparent.

Well-rounded: no original faces, edges or corners left. The entire surface consists of broad curves; flat areas are absent. The original shape is suggested by the present form of the grain.



I	Gravel	MINERAL
II	'Clayey' gravel	
III	'Very clayey' gravel	
IV	Sandy gravel	
V	'Clayey' sandy gravel	
VI	'Very clayey' sandy gravel	
VII	Pebbly sand	
VIII	'Clayey' pebbly sand	
IX	'Very clayey' pebbly sand	
X	Sand	
XI	'Clayey' sand	
XII	'Very clayey' sand	
(XIII)	NON-MINERAL	

Fig. 12. Diagram to show the descriptive categories used in the classification of sand and gravel

Appendix C: Borehole Records

EXPLANATION

Annotated Example of Borehole Record Sheet

TM 24 NW 25[1] 2466 4975[2] Hasketon, Suffolk[3]

Surface (+35.4 m) +116 ft[4]
Water struck at (+18.9 m) +62 ft[5]
Wirth B1, 6 inch diameter
March 1969[6]

Overburden[7] (12.2 m) 40 ft
Mineral (7.9 m) 26 ft
Bedrock (0.3 m +) 1 ft +[8]

		Thickness[11] (m)	ft	Depth[12] (m)	ft
	Soil	(0.3)	1	(0.3)	1
Boulder Clay[9]	Brown chalky boulder clay[10] changing to grey clay at (0.9 m) 3 ft and back to brown clay at (3.0 m) 10 ft and to dark blue-grey clay at (5.2 m) 17 ft.	(11.9)	39	(12.2)	40
Glacial Sand and Gravel	(a) Sand Fine to medium yellow sand.	(1.8)	6	(14.0)	46
Chillesford Beds	(b) 'Clayey' sand Fine to medium sand with silt and brown and green layers of clay.	(2.8)	9	(16.8)	55
Red Crag	(c) Sand Fine to medium red-brown sand.	(0.6)	2	(17.4)	57
	Medium sand, red-brown changing to yellow-brown at depth, with comminuted shells. A hard 3-inch layer of green shelly silt occurs at (18.6 m) 61 ft.	(2.7)	9	(20.1)	66
London Clay	Clay	(0.3+)	1+	(20.4)	67

			%	Depth below surface (ft)[13]	Percentages[14] Fines — 1/16	+1/16–¼	Sand +¼–1	+1–4	Gravel +4–16	+16
(a)[16]	Gravel	1%	+16 mm : 0	40 - 43	7	52	39	1	1	0
			–16+4 : 1	43 - 46	7	51	39	2	1	0
	Sand	92%	–4+1 : 2							
			–1+¼ : 39							
			–¼+1/16 : 51							
	Fines	7%	– 1/16 : 7							
(b)	Gravel	2%	+16 mm : 0	46 - 49	15	40	42	2	1	0
			–16+ : 2	49 - 52	16	37	40	5	2	0
				52 - 55	Grading information not available[15]					
	Sand	82%	–4+1 : 3							
			–1+¼ : 41							
			–¼+1/16 : 38							
	Fines	16%	– 1/16 : 16							
(c)	Gravel	2%	+16 mm : 0	55 - 58	6	46	44	3	1	0
			–16+4 : 2	58 - 61	8	41	46	4	1	0
				61 - 64	5	39	51	3	2	0
	Sand	91%	–4+1 : 4	64 - 66	7	30	53	8	2	0
			–1+¼ : 48							
			–¼+1/16 : 39							
	Fines	7%	– 1/16 : 7							

The numbered paragraphs below correspond with the annotations given on the specimen record above.

1. Borehole Registration Number.
Each MAU borehole is identified by a registration number. This consists of two statements.

1) The number of the 1 : 25 000 sheet on which the borehole lies, for example, TM 24.
2) The quarter of the 1 : 25 000 sheet on which the borehole lies and its number in a series for that quarter, for example, NW 25.

Thus the full Registration Number is TM 24 NW 25.

Usually this is abbreviated to NW 25 in the text.

2. The National Grid Reference.
All National Grid References in this publication lie within the 100 km square TM unless otherwise stated. Grid references are given to eight figures, accurate to within 10 m, for borehole locations. (In the text, six-figure grid references are used for more approximate locations, for example, for farms).

3. Location.
The borehole location is generally referred to the nearest named locality on the 1 : 25 000 base map.

4. Surface Level.
The surface level at the borehole site is given in metres and feet above Ordnance Datum. All measurements were made in feet; approximate metric conversions are given in brackets.

5. Groundwater Conditions.
Three kinds of entry are made; either, the level at which groundwater was encountered is given in metres and feet above Ordnance Datum; or, where no groundwater was encountered, this is stated; or, where there is no record of the groundwater conditions, this is stated.

6. Type of Drill and Date of Drilling.
Three types of drilling machine have been used in this survey; a Shell and Auger rig, a Wirth B1 (a cased power auger) and an Elmat E2 (a pneumatic percussive rig). The type of machine, the external diameter of the casing used, and the month and year of the completion of the borehole are stated.

7. Overburden, Mineral, Waste and Bedrock.
Overburden is any material other than mineral which occurs between the ground surface and the top of the mineral.

Mineral is defined as sand and gravel which, as part of a deposit falls within the arbitrary definition of potentially workable material (see p. 1).

Waste is any material other than mineral or bedrock occurring below or between beds of mineral.

Bedrock is the formation, rock type, country rock or rock-head, below which potentially workable sand and gravel will not be found. In the Woodbridge area the bedrock is London Clay.

Thicknesses are given in metres and feet.

8. The plus sign (+) indicates that the base of the deposit was not reached during drilling.

9. Geological Classification.
A geological classification of the strata encountered in drilling is given whenever possible. (For an explanation of the terms used see p. 3).

10. Lithological Description.
When sand and gravel (mineral) is recorded a general description based on the mean grading characteristics is followed by more detailed particulars. (For explanation of conventions see below). A description of other rock types is based on visual field examination.

11. Thickness
The figures relate to the individual thickness of items recorded in the log.

12. Depth
The figures given relate to depths to base of the strata recorded on the log.

13. Sampling.
A continuous series of bulk samples is taken throughout the thickness of sand and gravel. A new sample is commenced whenever there is an appreciable lithological change within the sand and gravel, or for every 3 ft of depth (see also p. 3).

14. Grading Results.
The limits are as follows: gravel, +4 mm; sand, coarse, -4+1 mm, medium, -1+¼ mm, fine, -¼+1/16 mm; fines, —1/16.

15. Exceptionally the grading results for an individual sample may not be available. No attempt has been made to estimate the probable grading of such samples, and the grading display box on the face of the map may be omitted.

16. Mean Grading.
The mean grading for the mineral thickness is the mean of the individual sample gradings, but where the thicknesses of mineral represented by the samples are not constant each grading result is first weighted by its relative thickness. The separate mean gradings relate to the geological classification in the log.

Note on Metrication

1) All measurements were made in feet. Approximate metric conversions appear in brackets.
2) Metric conversions of measurements of the depth and thickness of beds have been rounded off to the nearest 0.1 m, because quotation to two places of decimals would imply a higher order of accuracy than could be justified by the original figures. To eliminate any discrepancy appearing after metrication between depth as recorded and depth as obtained by summing thicknesses, adjustment has been made where necessary to one or more of the thickness figures. However, the recorded mineral thickness is not adjusted.

LIST OF ASSESSMENT BOREHOLES ON SHEET TM 24

Borehole No. by sheet quadrant	Grid reference (all fall in 100 km square TM)	Borehole No.	Grid references
TM 24 NW		TM 24 SW	
1	2080 4932	7	2402 4400
2	2077 4873	8	2361 4471
3	2004 4778	9	2197 4401
4	2084 4801	10	2109 4471
5	2064 4675	11	2115 4405
6	2037 4632	12	2041 4360
7	2163 4976	13	2160 4214
8	2179 4843	14	2062 4122
9	2143 4698	15	2038 4070
10	2182 4654	16	2181 4289
11	2106 4595	17	2126 4234
12	2209 4946	18	2182 4163
13	2238 4859	19	2130 4065
14	2292 4812	21	2262 4231
15	2206 4778	22	2236 4132
16	2235 4693	23	2261 4068
17	2200 4600	24	2416 4310
18	2198 4515	25	2360 4241
19	2297 4600	26	2352 4160
20	2376 4981	27	2367 4074
21	2375 4839	28	2442 4243
22	2424 4738	29	2454 4150
23	2307 4696	30	2438 4035
24	2307 4503		
25	2466 4975	TM 24 SE	
26	2454 4850		
27	2483 4658	6	2807 4412
28	2408 4604	7	2700 4400
29	2427 4595	8	2598 4402
30	2492 4601	9	2513 4500
31	2398 4501	10	2500 4412
		11	2513 4307
TM 24 NE		12	2589 4190
		13	2520 4175
10	2535 4956	14	2556 4079
11	2580 4835	15	2626 4325
12	2551 4632	16	2683 4269
13	2516 4538	17	2640 4138
15	2617 4641	19	2777 4373
16	2611 4585	21	2761 4118
17	2600 4516	22	2762 4043
18	2700 4508	23	2838 4327
20	2747 4548	24	2833 4237
22	2892 4928	25	2859 4027
23	2834 4820	26	2900 4204
24	2839 4754	27	2935 4135
25	2854 4695		
26	2974 4910		
27	2947 4843		
28	2957 4752		
29	2965 4648		
30	2979 4605		

THE RECORDS

TM 24 NW 1 2080 4932 Culpho, Suffolk

Surface (+ 43.6 m) + 143 ft
Water struck at (+ 23.5 m) + 77 ft
Wirth B1, 8 inch diameter
February 1969

Overburden (14.3 m) 47 ft
Mineral (10.4 m) 34 ft
Bedrock (0.3 m +) 1 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Boulder Clay	Yellow-brown clay with chalk and flint pebbles changing at (4.3 m) 14 ft to blue-grey clay with an increase in chalk content. Bottom two feet rather sandy.	(14.0)	46	(14.3)	47
Glacial Sand and Gravel	Sand. Fine to medium yellow-brown sand with a trace of gravel. Gravel concentration at (16.5 m) 54 ft underlain by (0.6 m) 2 ft of blue-grey clay with chalk pebbles.	(4.0)	13	(18.3)	60
Red Crag	Fine to medium red-brown sand with occasional pebbles.	(4.3)	14	(22.6)	74
	Fine to medium sand with shell fragments. Red brown to (23.5 m) 77 ft then grey to (24.7 m) 81 ft.	(2.1)	7	(24.7)	81
London Clay	Grey clay.	(0.3+)	1+	(25.0)	82

No grading information available

TW 24 NW 2 2077 4873 Culpho, East Suffolk

Surface (+ 31.4 m) + 103 ft
Water struck at (24.7 m) + 81 ft
Wirth B1, 6 inch diameter
February 1969

Overburden (0.3 m) 1 ft
Mineral (10.4 m) 34 ft
Bedrock (0.1 m +) 0.5 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel (a)	Sand, Dark brown sand with clay.	(0.9)	3	(1.2)	4
	Yellow brown sand with occasional flint pebbles.	(2.9)	9.5	(4.1)	13.5
Red Crag (b)	Sand. Red brown sand with iron concretions changing to dark chocolate to red brown sand at (5.8 m) 19 ft.	(4.0)	13	(8.0)	26.5
	Red brown sand with shell fragments and occasional black pebbles.	(2.6)	8.5	(10.7)	35
London Clay	Blue clay.	(0.1+)	0.5+	(10.8)	35.5

			%	Depth below surface (ft)	Fines	Sand			Gravel	
					$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel 3%	+16 mm :	1	1 - 4	14	39	36	3	3	5
		−16 +4 :	2	4 - 7	9	31	55	4	1	0
				7 - 10	8	23	67	1	1	0
	Sand 89%	−4 +1 :	3	10 - 13	3	24	70	2	1	0
		-1 $+\frac{1}{4}$:	57							
		$-\frac{1}{4}$ $+\frac{1}{16}$:	29							
	Fines 8%	$-\frac{1}{16}$:	8							
(b)	Gravel 1%	+16 mm :	0	13 - 16	8	55	35	1	1	0
		−16 +4 :	1	16 - 19	5	39	54	1	1	0
				19 - 22	6	16	76	1	1	0
	Sand 94%	−4 +1 :	5	22 - 25	4	47	48	1	0	0
		-1 $+\frac{1}{4}$:	51	25 - 28	3	39	53	4	1	0
		$-\frac{1}{4}$ $+\frac{1}{16}$:	38	28 - 31	6	31	48	13	2	0
				31 - 35	7	36	44	11	2	0
	Fines 5%	$-\frac{1}{16}$:	5							

TM 24 NW 3 2004 4778 Tuddenham, Suffolk

Surface (+ 36.6 m) + 120 ft
Groundwater conditions not recorded
Wirth B1, 6 inch diameter
March 1969

Overburden (0.3 m) 1 ft
Mineral (4.6 m) 15 ft
Waste (2.7 m) 9 ft
Mineral (7.3 m) 24 ft
Bedrock (0.3 m +) 1 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Yellow and brown fine to medium sand with gravel	(4.6)	15	(4.9)	16
Chillesford Beds		Bright green and red-brown clays with green silt.	(2.7)	9	(7.6)	25
	(b)	"Clayey" Sand. Green and yellow sand and silt with green clay partings.	(1.8)	6	(9.4)	31
Red Crag	(c)	Sand. Bright red-ochreous sand with dark red-brown sand towards base.	(3.2)	10.5	(12.6)	41.5
		Dark chocolate-brown sand with shell fragments changing to yellow-brown shelly sand. Phosphatic pebbles at base.	(2.3)	7.5	(15)	49
London Clay		Blue-grey clay.	(0.3+)	1+	(15.2)	50

				%	Depth below surface (ft)	Fines	Sand			Gravel	
						$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel	5%	+16 mm	2%	1 - 4	11	33	36	6	5	9
			−16 +4	3	4 - 7	5	38	52	3	1	1
					7 - 10	3	29	63	2	3	0
	Sand	89%	−4 +1	3	10 - 13	5	26	65	2	2	0
			−1 $+\frac{1}{4}$	57	13 - 16	7	22	68	1	2	0
			$-\frac{1}{4}$ $+\frac{1}{16}$	29							
	Fines	6%	$-\frac{1}{16}$	6							
(b)	Gravel	0%	+16 mm	0	25 - 28	11	54	34	0	1	0
			−16 +4	0	28 - 31	16	57	26	1	0	0
	Sand	87%	−4 +1	1							
			−1 $+\frac{1}{4}$	30							
			$-\frac{1}{4}$ $+\frac{1}{16}$	56							
	Fines		$-\frac{1}{16}$	13							
(c)	Gravel	2%	+16 mm	0	31 - 34	5	15	75	3	2	0
			−16 +4	2	34 - 37	5	7	81	5	2	0
					37 - 40	4	46	46	3	1	0
	Sand	92%	−4 +1	7	40 - 43	12	24	62	2	0	0
			−1 $+\frac{1}{4}$	61	43 - 46	5	22	55	15	3	0
			$-\frac{1}{4}$ $+\frac{1}{16}$	24	46 - 49	6	32	47	13	2	0
	Fines	6%	$-\frac{1}{16}$	6							

TM 24 NW 4 2084 4801 Playford, Ipswich

Surface (+ 32 m) 105 ft
Water struck at (+ 20.7 m) + 68 ft
Wirth B1, 6½ inch diameter
March 1969

Overburden (0.3 m) 1 ft
Mineral (11.9 m) 39 ft
Bedrock (1.5 m +) 5 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sand. Coarse yellow sand with fine gravel changing at (2.1 m) 7 ft to fine to medium yellow sand with brown clay.	(6.4)	21	(6.7)	22
Red Crag	(b)	Sand. Red-brown fine to medium sand.	(5.3)	17.5	(12.0)	39.5
		Red medium shelly sand.	(0.2)	0.5	(12.2)	40.0
London Clay		Brown clay.	(0.6)	2	(12.8)	42
		Blue-grey clay.	(0.9+)	3+	(13.7)	45

Insufficient grading information available; no grading display on map.

(b) Gravel 1% +16 mm : 0%
−16 +4 : 1
Sand 96% −4 +1 : 3
−1 +¼ : 60
−¼ +1/16 : 33
Fines 3% −1/16 : 3

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
0 - 13	No grading available					
13 - 16	10	63	25	0	2	0
16 - 19	No grading available					
19 - 22	7	46	44	1	2	0
22 - 25	No grading available					
25 - 28	1	21	76	1	1	0
28 - 31	3	34	59	3	1	0
31 - 34	2	30	66	1	1	0
34 - 37	5	49	40	4	2	0
37 - 40	6	31	56	6	1	0

TM 24 NW 5 2064 4675 Rushmere, Suffolk

Surface (+ 42.7 m) + 140 ft
Water struck at (+ 21.9 m) + 72 ft
Wirth B1, 6 inch diameter
June 1969

Overburden (7.0 m) 23 ft
Mineral (17.4 m +) 57 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Boulder Clay		Brown clay with abundant chalk and flint pebbles. Clayey gravel at base.	(6.7)	22	(7 0)	23
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium yellow sand with a trace of fine gravel to (10.4 m) 34 ft then medium yellow-brown sand with subangular flint and rounded quartzite gravel (flint mainly brown and black) to (14.0 m) 46 ft. Fine pale brown-yellow sand to (17.7 m) 58 ft with grey sand at (16.2 - 16.8 m) 53 - 55 ft.	(10.7)	35	(17.7)	58
Red Crag	(b)	Sand. Fine to medium red to orange-brown sand.	(6.7+)	22+	(24.4)	80

				%
(a)	Gravel	5%	+16 mm :	1
			−16 +4 :	4
	Sand	86%	−4 +1 :	4
			−1 +¼ :	35
			−¼ +1/16 :	47
	Fines	9%	−1/16 :	9
(b)	Gravel	1%	+16 mm :	0
			−16 +4 :	1
	Sand	92%	−4 +1 :	3
			−1 +¼ :	37
			−¼ +1/16 :	52
	Fines	7%	−1/16 :	7

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
23 - 25	12	21	50	9	8	0
25 - 28	3	32	59	4	1	1
28 - 31	3	41	53	2	1	0
31 - 34	5	41	52	1	1	0
34 - 37	5	26	61	5	2	1
37 - 40	6	14	57	10	10	3
40 - 43	8	20	44	11	14	3
43 - 46	10	47	27	7	7	2
46 - 49	12	74	10	2	2	0
49 - 52	11	86	1	1	1	0
52 - 55	13	80	4	1	2	0
55 - 58	13	80	6	1	0	0
58 - 61	7	61	30	1	1	0
61 - 64	11	53	32	3	1	1
64 - 67	7	39	50	3	1	0
67 - 70	8	53	35	3	1	0
70 - 73	8	53	36	2	1	0
73 - 76	6	53	39	2	0	0
76 - 80	5	47	38	9	1	0

TM 24 NW 6 2037 4632 Rushmere St Andrew, Suffolk

Surface (+ 38.4 m) + 126 ft
Water struck at (+ 22.9 m) +75 ft
Shell and auger, 6 inch diameter
December 1966

Overburden (0.6 m) 2 ft
Mineral (19.8 m) 65 ft
Bedrock (0.6 m +) 2 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel (a)	Pebbly Sand. Yellow-brown medium sand, clayey at the top. Gravel increases towards base.	(8.8)	29	(9.4)	31
Red Crag (b)	Pebbly Sand. Yellow-brown sand.	(10.4)	34	(19.8)	65
	Yellow-brown sand with shell fragments.	(0.6)	2	(20.4)	67
London Clay	Grey clay.	(0.6+)	2+	(21.0)	69

				%
(a)	Gravel 20%	+16 mm	:	10
		−16 +4	:	10
	Sand 73%	−4 +1	:	10
		−1 +¼	:	48
		−¼ +1/16	:	15
	Fines 7%	−1/16	:	7
(b)	Gravel 5%	+16 mm	:	2
		−16 +4	:	3
	Sand 94%	−4 +1	:	5
		−1 +¼	:	59
		−¼ +1/16	:	30
	Fines	−1/16	:	1

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
2 - 5)						
5 - 10)	No grading available					
10 - 15	20	18	29	9	7	17
15 - 20	3	23	66	6	2	0
20 - 25	2	10	49	12	14	13
25 - 30	2	10	49	12	15	12
30 - 35	2	35	50	6	5	2
35 - 40	No grading available					
40 - 45	2	37	53	8	0	0
45 - 50	No grading available					
50 - 55	0	15	68	5	7	5
55 - 60	No grading available					
60 - 65	0	32	66	2	0	0
65 - 67	No grading available					

TM 24 NW 7 2163 4966 Culpho, Suffolk

Surface (+ 43.0 m) + 141 ft
Water struck at (+ 23.8 m) + 78 ft
Wirth B1, 8 inch diameter
February 1969

Overburden (13.1 m) 43 ft
Mineral (10.6 m) 35 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Boulder Clay		Brown clay with chalk pebbles changing to blue clay at (4.6 m) 15 ft and back to brown at (9.8 m) 32 ft.	(12.8)	42	(13.1)	43
Glacial Sand and Gravel	(a)	"Clayey" Pebbly Sand. Fine to medium yellow-brown sand with clay and gravel at the top changing to medium sand with little gravel.	(3.4)	11	(16.5)	54
Red Crag	(b)	Sand. Medium brown sand with occasional pebbles.	(4.2)	14	(20.7)	68
		Medium to coarse sand with shell fragments. Red-brown at the top changing to grey at (22.6 m) 74 ft.	(3.0)	10	(23.7)	78
London Clay		Blue clay.	(0.6+)	2+	(24.3)	80

					%
(a)	Gravel	5%	+16 mm	:	2
			−16 +4	:	3
	Sand	82%	−4 +1	:	3
			−1 +¼	:	53
			−¼ +1/16	:	26
	Fines	13%	−1/16	:	13
(b)	Gravel	2%	+16 mm	:	1
			−16 +4	:	1
	Sand	91%	−4 +1	:	4
			−1 +¼	:	47
			−¼ +1/16	:	40
	Fines	7%	−1/16	:	7

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
43 - 45	26	32	34	2	3	3
45 - 48	11	20	57	5	5	2
48 - 51	10	33	49	6	1	1
51 - 54	6	18	74	0	1	1
54 - 57	7	50	37	4	2	0
57 - 60	12	39	42	4	1	2
60 - 63	10	34	51	2	2	1
63 - 66	5	38	55	1	1	0
66 - 69	7	31	55	5	0	2
69 - 72	1	61	33	3	1	1
72 - 75	6	34	52	6	2	0
75 - 78	No grading available					

TM 24 NW 8 2179 4843 Playford, Suffolk

Surface (+ 39.3 m) + 129 ft
Water struck at (+ 20.1 m) + 66 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (4.6 m) 15 ft
Mineral (16.4 m) 54 ft
Bedrock (0.6 m +) 2 ft +

		Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
Boulder Clay		Brown weathered clay with abundant chalk pebbles.	(4.3)	14	(4.6)	15
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium yellow-green sand with irregular flint and subrounded quartzite gravel.	(4.3)	14	(8.9)	29
Chillesford Beds	(b)	Sand. Fine sand with silt, pale green.	(3.0)	10	(11.9)	39
Red Crag	(c)	Sand. Medium sand becoming finer at depth. Ochreous red to yellow-red (0.9 m) 3 ft shell band at (14.9 m) 49 ft. Bottom (1.5 m) 5 ft rather silty.	(5.5)	18	(17.4)	57
		Fine to medium sand, some silt and comminuted shells.	(3.6)	12	(21.0)	69
London Clay		Blue-grey clay.	(0.6+)	2+	(21.6)	71

				%
(a)	Gravel	8%	+16 mm :	4
			−16 +4 :	4
	Sand	86%	−4 +1 :	2
			−1 +¼ :	45
			−¼ +1/16 :	39
	Fines	6%	−1/16 :	6
(b)	Gravel	2%	+16 mm :	1
			−16 +4 :	1
	Sand	94%	−4 +1 :	2
			−1 +¼ :	34
			−¼ +1/16 :	58
	Fines	4%	−1/16 :	4
(c)	Gravel	1%	+16 mm :	0
			−16 +4 :	1
	Sand	90%	−4 +1 :	5
			−1 +¼ :	44
			−¼ +1/16 :	41
	Fines	9%	−1/16 :	9

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
15 - 18	8	21	37	6	13	15
18 - 21	4	26	66	2	2	0
21 - 24	7	47	36	3	4	3
24 - 27	7	46	46	1	0	0
27 - 30	6	53	40	0	1	0
30 - 33	4	61	33	1	1	0
33 - 36	2	86	11	0	1	0
36 - 39	6	28	60	4	0	2
39 - 42	5	19	73	2	1	0
42 - 45	6	31	58	4	1	0
45 - 48	6	33	54	4	1	2
48 - 51	5	33	55	3	1	3
51 - 54	18	60	20	1	1	0
54 - 57	16	68	15	0	1	0
57 - 60	16	57	24	2	0	1
60 - 63	8	35	50	7	0	0
63 - 66	7	41	39	12	1	0
66 - 69	8	29	50	12	1	0

TM 24 NW 9 2143 4698 Playford, Suffolk

Surface (+ 41.8 m) + 137 ft
Water struck at (+ 20.4 m) + 67 ft
Wirth B1, 6-8 inch diameter
January 1969

Overburden (8.2 m) 27 ft
Mineral (16.2 m +) 53 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Boulder Clay		Grey clay with flint and chalk pebbles.	(7.9)	26	(8.2)	27
Glacial Sand	(a)	Pebbly Sand. Fine to medium yellow-brown sand with two concentrations of gravel at (9.8 m) 32 ft and (14.6 m) 48 ft, both (1.8 m) 6 ft thick. Gravel composed of angular to subrounded flint and rounded quartzite.	(10.1)	33	(18.3)	60
Red Crag	(b)	Sand. Fine to medium red-brown sand.	(5.5)	18	(23.8)	78
		Medium red-brown sand with shell fragments.	(0.6+)	2+	(24.4)	80

					%
(a)	Gravel	7%	+16 mm	:	3
			−16 +4	:	4
	Sand	86%	−4 +1	:	8
			−1 +¼	:	41
			−¼ +1/16	:	37
	Fines		−1/16	:	7
(b)	Gravel	1%	+16 mm	:	0
			−16 +4	:	1
	Sand	89%	−4 +1	:	3
			−1 +¼	:	46
			−¼ +1/16	:	40
	Fines	10%	−1/16	:	10

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
27 - 30	6	39	52	1	1	1
30 - 33	5	50	37	6	2	0
33 - 36	6	17	46	16	8	7
36 - 39	4	39	36	6	7	8
39 - 42	6	46	39	6	2	1
42 - 45	11	23	56	8	2	0
45 - 48	3	24	57	11	5	0
48 - 51	6	16	45	11	10	12
51 - 54	6	22	46	9	9	8
54 - 57	12	66	17	4	1	0
57 - 60	13	66	16	5	0	0
60 - 63	11	42	45	2	0	0
63 - 66	6	41	49	3	1	0
66 - 69	11	43	43	2	1	0
69 - 72	8	48	42	2	0	0
72 - 75	11	48	37	3	1	0
75 - 78	13	27	56	4	0	0
78 - 80	12	34	47	6	1	0

TM 24 NW 10 2182 4654 Playford, Suffolk

Surface (+ 37.2 m) + 122 ft
Water struck at (+ 20.1 m) + 66 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (2.1 m) 7 ft
Mineral (20.1 m) 66 ft.
Bedrock just touched

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Boulder Clay	Brown clay and silt with black and brown flints up to (75 mm) 3 ins.	(1.8)	6	(2.1)	7
Glacial Sand and Gravel (a)	Pebbly Sand. Medium to coarse brown and yellow sand, clayey for the top (1.5 m) 5 ft. Gravel of angular to subrounded brown, red and black flint with some rounded white quartzite. Mainly medium to coarse. Gravel occurs at two levels (3.7 m) 12 ft and (8.5 m) 28 ft of thicknesses (1.5 m) 5 ft and (2.1 m) 7 ft respectively.	(10.0)	33	(12.2)	40
Red Crag (b)	Pebbly Sand. Fine to medium red-brown sand with gravel concentrated in the top (1.8 m) 6 ft. Gravel fine to medium, composed of brown subrounded flint.	(6.4)	21	(18.6)	61
	Medium to coarse red-brown sand with shell fragments.	(3.7)	12	(22.3)	73
London Clay	Blue-grey clay.		Just touched.		

(a) Gravel 13% +16 mm : 5
−16 +4 : 8
Sand 83% −4 +1 : 6
−1 +¼ : 55
−¼ +1/16 : 22
Fines 4% −1/16 : 4

(b) Gravel 6% +16 mm : 1
−16 +4 : 5
Sand 90% −4 +1 : 7
−1 +¼ : 34
−¼ +1/16 : 49
Fines 4% −1/16 : 4

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
		Percentages				
7 - 10	17	31	25	5	9	13
10 - 13	7	23	54	7	7	2
13 - 16	No grading available					
16 - 19	3	28	66	1	1	1
19 - 22	3	23	60	5	6	3
22 - 25	3	20	58	5	9	5
25 - 28	1	14	57	9	11	8
28 - 31	2	21	35	14	27	1
31 - 34	2	21	59	5	10	3
34 - 37	1	21	65	4	5	4
37 - 40	2	15	66	9	3	5
40 - 43	2	14	59	13	8	4
43 - 46	4	15	45	12	22	2
46 - 49	7	57	24	8	4	0
49 - 52	6	46	33	10	4	1
52 - 55	5	45	38	8	4	0
55 - 58	4	48	33	9	6	0
58 - 61	4	57	30	6	3	0
61 - 64	4	72	18	5	0	1
64 - 67	3	71	20	5	0	1
67 - 70	3	43	51	1	2	0
70 - 73	5	66	24	4	1	0

TM 24 NW 11 2106 4595 Martlesham, Suffolk

Surface (+ 33.2 m) + 109 ft
Water struck at (+ 29.1 m) + 72 ft
Shell and auger, 6 inch diameter
October 1966

Overburden (0.6 m) 2 ft
Mineral (15.4 m) 50.5 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Gravel. Clayey gravel to (4.6 m)) 15 ft, then coarse sandy gravel, with cobbles to base.	(13.4)	44	(14.0)	46
Red Crag	(b)	Sand. Medium to coarse sand with shell fragments.	(2.0)	6.5	(16.0)	52.5
London Clay		Blue clay.	(0.6+)	2+	(16.6)	54.5

				%
(a)	Gravel	55%	+16 mm	36
			-16 +4	19
	Sand	43%	-4 +1	14
			-1 +¼	22
			-¼ +1/16	7
	Fines	2%	-1/16	2
(b)	Gravel	4%	+16 mm	0
			-16 +4	4
	Sand	94%	-4 +1	27
			-1 +¼	50
			-¼ +1/16	17
	Fines	2%	-1/16	2

Depth below surface (ft)	Fines	Percentages Sand			Gravel	
	-1/16	+1/16-¼	+¼-1	+1-4	+4-16	+16
5 - 10	2	21	52	10	11	4
10-- 15	3	8	31	20	19	19
15 - 20	4	6	20	15	21	34
20 - 25	1	3	12	11	17	56
25 - 30	1	5	18	15	18	43
30 - 35	2	5	18	11	20	44
35 - 40	0	4	15	22	28	31
40 - 45	1	4	11	12	18	54
45 - 50	1	12	51	32	4	0
50 - 52.5	3	22	49	23	3	0

TM 24 NW 12 2209 4946 Grundisburgh, Suffolk

Surface (+ 37.8 m) + 124 ft
Water struck at (+ 21.9 m) 72 ft
Wirth B1, 5-6 inch diameter
June 1969

Overburden (5.5 m) 18 ft
Mineral (15.2 m) 50 ft
Bedrock just touched

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Boulder Clay		Brown clay with flints.	(2.1)	7	(2.4)	8
		Medium clayey sand.	(0.2)	0.5	(2.5)	8.5
		Brown clay with chalk pebbles	(2.9)	9.5	(5.5)	18
Glacial Sand and Gravel	(a)	"Clayey" Pebbly Sand. Medium yellow/brown sand, rather clayey, with some flint and quartzite gravel.	(2.7)	9	(8.2)	27
Chillesford Beds	(b)	Sand. Fine fawn to light green sand.	(3.0)	10	(11.2)	37
Red Crag	(c)	Sand. Fine to medium ochreous brown sand with occasional pebbles.	(5.5)	18	(16.7)	55
		Medium red-brown sand with shell fragments, changing to blue-grey at (20.1 m) 66 ft.	(4.0)	13	(20.7)	68
London Clay		Blue clay.		Just touched.		

				%	Depth below surface (ft)	Fines	Sand			Gravel	
						$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel	6%	+16 mm :	2	18 - 21	16	52	29	1	1	1
			−16 +4 :	4	21 - 24	6	38	47	4	3	2
					24 - 27	16	23	46	5	7	3
	Sand	81%	−4 +1 :	3							
			−1 $+\frac{1}{4}$:	40							
			$-\frac{1}{4}$ $+\frac{1}{16}$:	38							
	Fines	13%	$-\frac{1}{16}$:	13							
(b)	Gravel	1%	+16 mm :	0	27 - 30	6	85	6	1	1	0
			−16 +4 :	1	30 - 33	2	92	4	1	1	0
					33 - 36	5	92	2	0	1	0
	Sand	95%	−4 +1 :	1							
			−1 $+\frac{1}{4}$:	4							
			$-\frac{1}{4}$ $+\frac{1}{16}$:	90							
	Fines	4%	$-\frac{1}{16}$:	4							
(c)	Gravel	1%		0	36 - 39	20	62	16	2	0	0
				1	39 - 42	5	42	51	1	1	0
					42 - 45	6	38	54	1	1	0
	Sand	93%		4	45 - 48	3	38	56	2	1	0
				47	48 - 52	5	38	52	3	1	1
				42	52 - 55	5	43	49	2	1	0
					55 - 58	4	38	55	2	1	0
	Fines	6%		6	58 - 61	4	34	47	12	1	2
					61 - 64	6	36	51	5	2	0
					64 - 68	4	55	36	4	1	0

TM 24 NW 13 2238 4859 Great Bealings, Suffolk

Surface (+ 30.5 m) + 100 ft
Water struck at (+ 21.0 m) + 69 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (4.1 m) 13.5 ft
Mineral (10.5 m) 34.5 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
		Made ground.	(2.1)	7	(2.4)	8
Boulder Clay		Grey clay with abundant boulders of flint and chalk.	(1.7)	5.5	(4.1)	13.5
Glacial Sand and Gravel	(a)	Sand Fine to medium yellow sand becoming red-yellow at (6.5 m) 21.5 ft. Few pebbles.	(4.1)	13.5	(8.2)	27
Red Crag	(b)	Sand Fine to medium red-brown sand becoming dark chocolate brown to black in lower (0.6 m) 2 ft.	(2.5)	8	(10.7)	35
		Coarse red sand with shell fragments and some quartoze gravel.	(3.9)	13	(14.6)	48
London Clay		Blue clay.	(0.6+)	2+	(15.2)	50

					%	Depth below surface (ft)	Fines $-\frac{1}{16}$	Sand $+\frac{1}{16}-\frac{1}{4}$	Sand $+\frac{1}{4}-1$	Sand $+1-4$	Gravel $+4-16$	Gravel $+16$
(a)	Gravel	1%	+16 mm	:	0	13.5 - 15.5	8	37	54	0	0	1
			−16 +4	:	1	15.5 - 18.5	3	66	29	1	1	0
						18.5 - 21.5	3	91	5	1	0	0
	Sand	94%	−4 +1	:	1	21.5 - 24.5	4	41	52	1	1	1
			−1 $+\frac{1}{4}$	:	39	24.5 - 27	7	37	54	1	1	0
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	54							
	Fines	5%	$-\frac{1}{16}$	:	5							
(b)	Gravel	1%	+16 mm	:	0	27 - 30	6	42	48	3	1	0
			−16 +4	:	1	30 - 33	10	31	54	4	1	0
						33 - 36	5	22	61	10	2	0
	Sand	93%	−4 +1	:	11	36 - 39	7	20	54	17	1	0
			−1 $+\frac{1}{4}$	:	49	39 - 42	7	24	53	15	1	0
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	33	42 - 45	5	38	40	15	1	1
						45 - 48	7	48	36	8	1	0
	Fines	6%	$-\frac{1}{16}$	:	6							

TM 24 NW 14 2292 4812 Little Bealings, Suffolk

Surface (+ 28.3 m) + 93 ft
Water struck at (+ 25.3 m) + 83 ft
Wirth B1, 6 inch diameter
May 1969

Overburden (0.3m) 1 ft
Mineral (4.6 m) 15 ft
Waste (1 2 m) 4 ft
Mineral (6.8 m) 22.5 ft
Bedrock (1.1 m +) 3.5 ft +

		Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium yellow sand with angular flint gravel. Gravel increasing towards the base.	(4.6)	15	(4.9)	16
Chillesford Beds		Red-brown clay, no gravel, passing into black peaty clay with thin layers of red-brown ferruginous clay. Bottom (0.1 m) 0.5 ft clayey gravel.	(1.2)	4	(6.1)	20
Red Crag	(b)	Pebbly Sand. Coarse sand with gravel passing into red-brown medium sand.	(6.1)	20	(12.2)	40
		Red-brown sand with shell fragments.	(0.7)	2.5	(12.9)	42.5
London Clay		Brown clay.	(0.3)	1	(13.2)	43.5
		Blue-grey clay	(0.8+)	2.5+	(14.0)	46

					%
(a)	Gravel	16%	=	+16 mm :	5
				−16 +4 :	11
	Sand	78%		−4 +1 :	7
				−1 +¼ :	45
				−¼ +1/16 :	26
	Fines	6%		−1/16 :	6
(b)	Gravel	5%		+16 mm :	0
				−16 +4 :	5
	Sand	86%		−4 +1 :	7
				−1 +¼ :	44
				−¼ +1/16 :	35
	Fines	9%		−1/16 :	9

Depth below surface (ft)	Fines	Percentages Sand			Gravel	
	−1/16	+1/16 −¼	+¼−1	+1−4	+4−16	+16
1 - 4	8	52	32	1	3	4
4 - 7	3	24	57	5	5	6
7 - 10	8	24	56	4	5	3
10 - 13	6	14	39	11	23	7
13 - 16	7	16	42	12	18	5
20 - 22	16	10	30	18	24	2
22 - 25	12	54	24	5	5	0
25 - 28	8	39	50	2	1	0
28 - 31	8	38	47	5	2	0
31 - 34	6	44	48	1	1	0
34 - 37	6	38	52	2	2	0
37 - 40	8	23	55	8	4	2
40 - 42.5	11	34	39	13	3	0

TM 24 NW 15 2206 4778 Playford, Suffolk

Surface (+ 21.3 m) +70 ft
Water struck at (+ 19.2 m) + 63 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (0.3 m) 1 ft
Mineral (5.2 m) 17 ft
Bedrock (0.6 m +) 2 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Red Crag	Sand.				
	Medium to coarse red-brown sand.	(1.7)	5.5	(2.0)	6.5
	Red-brown sand with shell fragments and phosphatic nodules.	(3.5)	11.5	(5.5)	18
London Clay	Brown clay.	(0.6+)	2+	(6.1)	20

	Depth below surface (ft)	Percentages Fines	Sand			Gravel	
		$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1-4	+4-16	+16
Data insufficient for mean percentage to be be calculated	1 - 4	9	31	54	4	2	0
	4 - 13	No grading available					
	13 - 16	6	21	53	16	4	0
	16 - 18	8	18	49	16	8	1

TM 24 NW 16 2235 4693 Little Bealings, Suffolk

Surface (+ 37.2 m) + 122 ft
Water struck at (+ 17.7 m) + 58 ft
Wirth B1, 8 inch diameter
January 1969

Overburden (4.6 m) 15 ft
Mineral (18.9 m +) 62 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Boulder Clay		Brown clay with chalk pebbles.	(4.3)	14	(4.6)	15
Glacial Sand and Gravel	(a)	Sand. Fine to medium yellow-brown sand, very little gravel. Sand becoming paler towards base. Some gravel at (7.9 m) 26 ft, mainly subangular flint and quartzite.	(10.0)	33	(14.6)	48
Red Crag	(b)	Sand. Fine to medium red-brown sand with some rounded brown flints.	(3.1)	10	(17.7)	58
		Medium sand, red-brown, with shell fragments and some iron concretions.	(5.8+)	9+	(23.5)	77

					%
(a)	Gravel	3%	+16 mm	:	1
			−16 +4	:	2
	Sand	91%	−4 +1	:	2
			−1 +¼	:	33
			−¼ +1/16	:	56
	Fines	6%	−1/16	:	6
(b)	Gravel	2%	+16 mm	:	1
			−16 +4	:	1
	Sand	92%	−4 +1	:	3
			−1 +¼	:	40
			−¼ +1/16	:	49
	Fines	6%	−1/16	:	6

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
15 - 17	12	61	25	0	2	0
17 - 20	3	36	54	4	1	2
20 - 23	5	50	35	6	4	0
23 - 26	2	28	52	6	6	6
26 - 29	12	49	37	1	1	0
29 - 33	14	45	39	1	1	0
33 - 36	10	42	47	1	0	0
36 - 39	0	89	9	1	1	0
39 - 42	2	91	6	0	1	0
42 - 45	2	73	23	2	0	0
45 - 48	3	53	39	4	1	0
48 - 50	9	42	44	3	2	1
50 - 53	5	55	38	1	1	0
53 - 56	9	30	60	1	0	0
56 - 57.5	6	46	46	1	0	1
57.5 - 60.5	No grading available					
60.5 - 63.5	4	56	34	3	1	2
63.5 - 66.5	4	61	32	2	1	0
66.5 - 69.5	2	59	34	3	2	0
69.5 - 72.5	7	49	34	9	1	0
72.5 - 77	No samples taken.					

TM 24 NW 17 2200 4600 Playford, Suffolk

Surface (+ 32.6 m) +107 ft
Ground water conditions not recorded.
Shell & auger, 6 inch diameter
October 1966

Overburden (0.3 m) 1 ft
Mineral (15.2 m) 50 ft
Bedrock (1.2 m +) 4 ft

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium sand becoming medium to coarse with depth. Fine and coarse gravel, percentage increasing with depth.	(9.5)	31	(9.8)	32
Red Crag	(b)	Pebbly Sand. Fine, medium and coarse sands, dark brown, traces of clay and some fine to medium gravel.	(3.0)	10	(12.8)	42
		Medium to coarse sand becoming fine to medium with depth. Some fine to medium gravel. Comminuted shells present.	(2.7)	9	(15.5)	51
London Clay		Blue-grey clay.	(1.2+)	4+	(16.7)	55

					%
(a)	Gravel	15%	+16 mm	:	6
			−16 +4	:	9
	Sand	84%	−4 +1	:	10
			−1 +¼	:	52
			−¼ +1/16	:	22
	Fines	1%	−1/16	:	1
(b)	Gravel	15	+16 mm	:	7
			−16 +4	:	8
	Sand	83%	−4 +1	:	18
			−1 +¼	:	40
			−¼ +1/16	:	25
	Fines	2%	−1/16	:	2

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
0 - 5	4	29	39	4	8	16
5 - 10	2	43	52	3	0	0
10 - 15	0	32	55	5	5	3
15 - 20	0	12	54	16	10	8
20 - 25	0	12	43	17	21	7
25 - 30	0	5	67	16	9	3
30 - 35	1	9	43	22	12	13
35 - 40	3	19	51	12	17	8
40 - 45	2	23	35	23	8	9
45 - 50	0	50	30	15	5	0
50 - 51	1	19	49	18	9	4

TM 24 NW 18 2198 4515 Martlesham, Suffolk

Surface (+ 33.5 m) +110 ft
Water struck at (+ 22.2 m) + 73 ft
Shell & auger, 6 inch diameter
November 1966

Overburden (0.3 m) 1 ft
Mineral (17.1 m) 56 ft
Bedrock (0.9 m +) 3 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
			(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium sand with gravel. Deposit split by a (0.5 m) 1.5 ft thick clay band at (7.2 m) 26 ft.	(11.3)	37	(11.6)	38
Red Crag	(b)	Pebbly Sand. Sand with shell fragments, becoming gravelly towards the base.	(5.8)	19	(17.4)	57
London Clay		Clay.	(0.9+)	3+	(18.3)	60

					%
(a)	Gravel	17%	+16 mm	:	10
			−16 +4	:	7
	Sand	80%	−4 +1	:	7
			−1 +¼	:	51
			−¼ +1/16	:	22
	Fines	3%	−1/16	:	3
(b)	Gravel	6%	+16 mm	:	1
			−16 +4	:	5
	Sand	94%	−4 +1	:	16
			−1 +¼	:	46
			−¼ +1/16	:	32
	Fines	0%	−1/16	:	0

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
0 - 5	15	15	32	4	5	29
5 - 10	0	42	39	3	3	13
10 - 15	0	35	51	5	6	3
15 - 20	0	25	61	8	4	2
20 - 25	0	14	70	2	6	8
25 - 30	4	18	48	15	12	3
30 - 35	1	17	67	8	4	3
35 - 40	0	12	43	8	16	21
40 - 45	0	15	62	16	6	1
45 - 50	No grading available					
50 - 55	0	50	30	16	4	0
55 - 57	No grading available					

Mean grading of (b) based on two samples only

TM 24 NW 19 2297 4600 Martlesham, Suffolk

Surface (+ 31.7 m) + 104 ft
Ground water conditions not recorded
Shell & Auger, 6 inch diameter
October 1966

Overburden (0.3 m) 1 ft
Mineral (18,1 m) 59.5 ft
Bedrock (0.3 m +) 1 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium sand with gravel. Gravel proportion increasing with depth.	(7.0)	23	(7.3)	24
Red Crag	(b)	Pebbly Sand. Dark brown sand with cemented sand at base.	(4.9)	16	(12.2)	40
		Dark brown sand with shell fragments and some fine gravel, underlain by a hard brown-grey sandstone.	(6.2)	20.5	(18.4)	60.5
London Clay		Blue clay.	(0.3+)	1+	(18.7)	61.5

			%
(a)	Gravel 23%	+16 mm	12
		−16 +4	11
	Sand 75%	−4 +1	7
		−1 +¼	43
		−¼ +1/16	25
	Fines 2%	−1/16	2
(b)	Gravel 8%	+16 mm	2
		−16 +4	6
	Sand 88%	−4 +1	16
		−1 +¼	38
		−¼ +1/16	34
	Fines 4%	−1/16	4

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
0 - 5	10	57	13	1	15	4
5 - 10	0	33	52	4	7	4
10 - 15	0	15	70	9	4	2
15 - 20	0	13	48	9	12	18
20 - 25	0	5	33	14	16	32
25 - 30	0	31	53	4	7	5
30 - 35	No grading available					
35 - 40	20	43	28	9	0	0
40 - 45	0	40	30	21	8	1
45 - 50	0	28	44	23	5	0
50 - 55	No grading available					
55 - 60	0	30	35	25	8	2

TM 24 NW 20 2376 4981 Hasketon

Surface (+ 30.8 m) + 101 ft
Water struck at (+ 19.5 m) + 64 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (1.5 m) 5 ft
Mineral (14.0 m) 46 ft
Bedrock (0.2 m +) 0.5 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Boulder Clay	Brown clay with chalk and flint pebbles.	(1.2)	4	(1.5)	5
Glacial Sand and Gravel (a)	Pebbly Sand. Medium to coarse brown sand with subrounded flint gravel, and some clay passing at (2.1 m) 7 ft into light brown silty sand and at (3.0 m) 10 ft into medium light brown sand with gravel. Gravel of rounded to subrounded flint and white quartzite.	(2.4)	8	(3.9)	13
Chillesofrd Beds (b)	Sand. Fine yellow-green sand.	(0.9)	3	(4.8)	16
Red Crag (c)	Sand. Fine to medium red-brown sand.	(8.1)	26.4	(12.9)	42.5
	Medium red-brown sand with shell fragments.	(2.6)	8.5	(15.5)	51
London Clay	Blue clay.	(0.2+)	0.5+	(15.7)	51.5

			%
(a)	Gravel 10%	+16 mm :	2
		−16 +4 :	8
	Sand 80%	−4 +1 :	8
		−1 +¼ :	31
		−¼ +1/16 :	41
	Fines 10%	−1/16 :	10
(b & c)	Gravel 1%	+16 mm :	0
		−16 +4 :	1
	Sand 94%	−4 +1 :	3
		−1 +¼ :	52
		−¼ +1/16 :	39
	Fines 5%	−1/16 :	5

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
5 - 7	13	13	34	15	22	3
7 - 10	15	63	19	0	1	2
10 - 13	6	26	49	9	8	2
13 - 16	8	62	21	8	1	0
16 - 19	15	28	52	4	1	0
19 - 22	4	53	37	5	1	0
22 - 25	5	36	51	6	2	0
25 - 28	5	40	52	1	2	0
28 - 31	5	70	23	1	1	0
31 - 34	4	57	35	3	1	0
34 - 37	3	45	50	2	0	0
37 - 40	2	18	79	0	1	0
40 - 43	1	30	65	1	1	2
43 - 46	3	32	61	2	1	1
46 - 49	5	24	62	6	2	1
49 - 51	5	27	58	8	1	1

TM 24 NW 21 2375 4839 Great Bealings, Suffolk

Surface (+ 17.1 m) + 56 ft
Ground water conditions not recorded
Wirth B1, 6 inch diameter
March 1969

Overburden (0.3 m) 1 ft
Mineral (2.7 m) 9 ft
Bedrock just touched

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Red Crag	"Clayey" Pebbly Sand. Medium red-brown sand, rather clayey.	(0.6)	2	(0.9)	3
	Medium red-brown sand with shell fragments.	(2.1)	7	(3.0)	10
London Clay	Brown clay.		just touched		

				%
Gravel 10%	+16 mm	:		4
	−16 +4	:		6
Sand 79%	−4	+1	:	8
	−1	+¼	:	50
	−¼	+1/16	:	21
Fines 11%	−1/16		:	11

Depth below surface (ft)	Fines	Percentages Sand			Gravel	
	−1/16	+1/16−¼	+¼−1	+1−4	+4−16	+16
1 - 4	16	28	47	5	2	2
4 - 7	8	17	50	11	8	6
7 - 10	10	18	52	8	9	3

TM 24 NW 22 2424 4738 Little Bealings, Suffolk

Surface (+ 31.7 m) + 104 ft
Water not struck
Wirth B1, 6 inch diameter
March 1969

Overburden (0.3 m) 1 ft
Mineral (17.4 m) 57 ft
Bedrock (1.2 m +) 4 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium brown sand, rather silty, occasional flint pebble, passing at (5.5 m) 18 ft into medium pale green sand underlain by (0.6 m) 2 ft of fine white sand and at (6.7 m) 22 ft into fine light brown sand with clay becoming more gravelly at depth. Gravel of coarse angular to subangular flint.	(7.9)	26	(8.2)	27
Red Crag	(b)	Sand. Medium dark brown sand with a trace of rounded to subrounded flint gravel, passing at (9.1 m) 30 ft into medium red-brown sand with a trace of angular flint gravel. Occasional black (phosphatic) pebble at base.	(9.5)	31	(17.7)	58
London Clay		Brown clay changing to blue clay at depth.	(1.2+)	4+	(18.9)	62

				%
(a)	Gravel	5%	+16 mm :	3
			−16 +4 :	2
	Sand	89%	−4 +1 :	2
			−1 +¼ :	45
			−¼ +1/16 :	42
	Fines	6%	−1/16 :	6
(b)	Gravel	3%	+16 mm :	1
			−16 +4 :	2
	Sand	93%	−4 +1 :	3
			−1 +¼ :	49
			−¼ +1/16 :	41
	Fines	4%	−1/16 :	4

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
1 - 4	No grading available					
4 - 7	6	33	56	3	1	1
7 - 10	7	59	32	1	1	0
10 - 13	11	49	38	2	0	0
13 - 16	4	34	56	3	3	0
16 - 19	5	28	54	1	4	8
19 - 22	6	54	38	1	1	0
22 - 25	No grading available					
25 - 28	3	40	37	4	4	12
28 - 31	2	16	70	3	4	5
31 - 34	3	35	60	1	1	0
34 - 37	6	47	43	2	2	0
37 - 40	5	37	53	3	1	1
40 - 43	4	24	59	10	2	1
43 - 46	3	58	36	2	1	0
46 - 49	5	37	54	3	1	1
49 - 52	No grading available					
52 - 55	6	64	25	4	1	0
55 - 58	5	54	39	1	0	1

TM 24 NW 23 2307 4696 Little Bealings, Suffolk

Surface (+ 35.1 m) + 115 ft
Water struck at (+ 17.4 m) + 57 ft
Wirth B1, 6 inch diameter
January 1969

Overburden (0.3 m) 1 ft
Mineral (21.3 m) 70 ft
Bedrock (0.3 m +) 1 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium yellow-brown sand with layers of red-brown clay and subangular flint gravel. Clay and silt fraction increasing towards the base, passing at (4.0 m) 13 ft into fine to medium yellow sand with a trace of gravel and at (7.6 m) 25 ft into medium sand with gravel; gravel fine to medium subangular flint and rounded white quartzite.	(11.0)	36	(11.3)	37
Red Crag	(b)	Sand. Fine red-brown sand with occasional pebbles.	(3.5)	11.5	(14.8)	48.5
		Fine to medium red-brown sand with shell fragments.	(6.8)	22.5	(21.6)	71
London Clay		Blue clay.	(0.3+)	1+	(21.9)	72

					%
(a)	Gravel	11%	+16 mm	:	4
			-16 +4	:	7
	Sand	79%	-4 +1	:	7
			-1 +¼	:	36
			-¼ +1/16	:	36
	Fines	10%	-1/16	:	10
(b)	Gravel	3%	+16 mm	:	1
			-16 +4	:	2
	Sand	92%	-4 +1	:	7
			-1 +¼	:	38
			-¼ +1/16	:	47
	Fines	5%	-1/16	:	5

Depth below surface (ft)	Percentages Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
1 - 4	14	46	16	3	4	17
4 - 7	12	37	24	6	11	10
7 - 10	21	40	32	4	3	0
10 - 13	30	63	6	0	1	0
13 - 16	3	40	55	1	0	1
16 - 19	5	29	58	4	2	2
19 - 22	5	44	40	6	4	1
22 - 25	7	40	42	2	6	3
25 - 28	5	37	30	16	8	4
28 - 31	5	13	43	14	18	7
31 - 34	6	12	52	15	13	2
34 - 37	5	35	36	11	12	1
37 - 40	7	40	44	5	3	1
40 - 43	4	74	17	3	2	0
43 - 46	2	72	20	3	3	0
46 - 49	6	38	47	8	0	1
49 - 52	4	54	39	2	1	0
52 - 55	6	50	38	5	1	0
55 - 58	6	33	56	3	1	1
58 - 61	6	42	38	12	2	0
61 - 64	No grading available					
64 - 67	0	48	30	19	2	1
67 - 71	13	20	56	6	4	1

TM 24 NW 24 2307 4503 Martlesham, Suffolk

Surface (+ 31.7 m) + 104 ft
Water struck at (+ 21.0 m) + 69 ft
Shell and auger, 6 inch diameter
November 1966

Overburden (0.3 m) 1 ft
Mineral (17.4 m) 57 ft
Bedrock (0.9 m +) 3 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, medium, with gravel.	(8.2)	27	(8.5)	28
Red Crag	(b)	Pebbly Sand. Dark brown sand with comminuted shells.	(9.2)	30	(17.7)	58
London Clay		Stiff brown clay changing downwards to blue clay.	(0.9+)	3+	(18.6)	61

					%
(a)	Gravel	16%	+16 mm	:	7
			−16 +4	:	9
	Sand	83%	−4 +1	:	11
			−1 +¼	:	51
			−¼ +1/16	:	21
	Fines	1%	−1/16	:	1
(b)	Gravel	10%	+16 mm	:	5
			−16 +4	:	5
	Sand	90%	−4 +1	:	17
			−1 +¼	:	50
			−¼ +1/16	:	23
	Fines	0%	−1/16	:	0

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
0 - 5	8	31	48	3	5	5
5 - 10	0	28	56	6	2	8
10 - 15	0	25	50	5	14	6
15 - 20	0	26	54	10	8	2
20 - 25	0	5	46	15	18	16
25 - 30	0	13	52	25	8	2
30 - 35	0	21	51	16	6	6
35 - 40	No grading available					
40 - 45	0	30	50	15	5	0
45 - 55	No grading available					
55 - 58	0	17	47	21	5	10

Means (b) calculated from three samples only

TM 24 NW 25 2466 4975 Hasketon, Suffolk

Surface (+ 35.4 m) + 116 ft
Water struck at (+ 18.9 m) + 62 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (12.2 m) 40 ft
Mineral (7.9 m) 26 ft
Bedrock (0.3 m +) 1 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Boulder Clay		Brown chalky boulder clay changing to grey clay at (0.9 m) 3 ft and back to brown clay at (3.0 m) 10 ft and to dark blue-grey clay at (5.2 m) 17 ft.	(11.9)	39	(12.2)	40
Glacial Sand and Gravel	(a)	Sand. Fine to medium yellow sand.	(1.8)	6	(14.0)	46
Chillesford Beds	(b)	"Clayey" Sand. Fine to medium sand with silt and layers of brown and green clay.	(2.7)	9	(16.7)	55
Red Crag	(c)	Sand. Fine to medium red-brown sand.	(0.6)	2	(17.3)	57
		Medium sand, red-brown changing to yellow-brown at depth, with comminuted shells. A hard (76 mm) 3 in layer of green shelly silt occurs at (18.6 m) 61 ft.	(2.8)	9	(20.1)	66
London Clay		Clay.	(0.3+)	1+	(20.4)	67

				%	Depth below surface (ft)	Fines $-\frac{1}{16}$	Sand $+\frac{1}{16}-\frac{1}{4}$	Sand $+\frac{1}{4}-1$	Sand +1–4	Gravel +4–16	Gravel +16
(a)	Gravel	1%	+16 mm :	0	40 - 43	7	52	39	1	1	0
			−16 +4 :	1	43 - 46	7	51	39	2	1	0
	Sand	92%	−4 +1 :	2							
			−1 $+\frac{1}{4}$:	39							
			$-\frac{1}{4}$ $+\frac{1}{16}$:	51							
	Fines	7%	$-\frac{1}{16}$:	7							
(b)	Gravel	2%	+16 mm :	0	46 - 49	15	40	42	2	1	0
			−16 +4 :	2	49 - 52	16	37	40	5	2	0
					52 - 55	No grading available					
	Sand	82%	−4 +1 :	3							
			−1 $+\frac{1}{4}$:	41							
			$-\frac{1}{4}$ $+\frac{1}{16}$:	38							
	Fines	16%	$-\frac{1}{16}$:	16							
(c)	Gravel	2%	+16 mm	0	55 - 58	6	46	44	3	1	0
			−16 +4	2	58 - 61	8	41	46	4	1	0
					61 - 64	5	39	51	3	2	0
	Sand	91%	−4 +1	4	64 - 66	7	30	53	8	2	0
			−1 $+\frac{1}{4}$	48							
			$-\frac{1}{4}$ $+\frac{1}{16}$	39							
		7%	$-\frac{1}{16}$	7							

TM 24 NW 26 2454 4850 Great Bealings, Suffolk

Surface (+ 37.5 m) + 123 ft
Water struck at (+ 22.6 m) + 74 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (0.3 m) 1 ft
Mineral (7.8 m) 26.5 ft
Waste (1.3 m) 4.5 ft
Mineral (9.8 m) 32 ft
Bedrock just touched

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Brown silty sand with gravel. Gravel composed of brown and black flint passing at (2.1 m) 7 ft into fine to medium yellow-brown sand with gravel. Gravel of angular black and white flint and rounded white quartzite.	(7.8)	25.5	(8.1)	26.5
Chillesford Beds		Pale green silty clay passing into pale green clay at (8.5 m) 28 ft.	(1.3)	4.5	(9.4)	31
	(b)	'Very Clayey' Sand. Pale green silty sand with clay.	(1.0)	3	(10.4)	34
Red Crag	(c)	Sand. Fine to medium red-brown sand with a trace of gravel. Gravel of angular to subangular black-brown flint; gravel percentage decreases with depth.	(4.5)	15	(14.9)	49
		Medium red-brown sand with comminuted shells and occasional thin bands of red clay.	(4.3)	14	(19.2)	63
London Clay		Clay.	Just touched			

				%
(a)	Gravel	9%	+16 mm	4
			−16 +4	5
	Sand	82%	−4 +1	4
			−1 +¼	31
			−¼ +1/16	47
	Fines	9%	−1/16	9
(b & c)	Gravel	3%	+16 mm	1
			−16 +4	2
	Sand	87%	−4 +1	3
			−1 +¼	39
			−¼ +1/16	45
	Fines	10%	−1/16	10

Depth below surface (ft)	Fines	Sand			Gravel	
	−1/16	+1/16 −¼	+¼ −1	+1 −4	+4 −16	+16
1 - 4	16	37	27	3	8	9
4 - 7	14	37	29	4	6	10
7 - 10	6	57	22	3	6	6
10 - 13	6	62	30	1	1	0
13 - 16	9	40	31	6	9	5
16 - 19	No grading available					
19 - 22	6	29	58	3	4	0
22 - 25	1	56	33	4	4	2
25 - 28	13	60	18	5	4	0
31 - 34	31	64	4	0	1	0
34 - 37	12	26	44	8	8	2
37 - 40	4	52	34	6	3	1
40 - 43	6	66	24	3	1	0
43 - 46	3	52	44	0	0	1
46 - 49	5	33	59	2	1	0
49 - 52	5	32	59	3	0	1
52 - 55	19	44	32	3	1	1
55 - 58	18	39	39	2	2	0
58 - 61	6	44	45	2	2	1
61 - 63	5	42	44	2	4	3

TM 24 NW 27 2483 4658 Martlesham, Suffolk

Surface (+ 31.4 m) +103 ft
Water struck at (+ 18.3 m) + 60 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (0.3 m) 1 ft
Mineral (14.6 m) 48 ft
Bedrock (0.6 m +) 2 ft

		Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium fawn-brown sand with a trace of flint gravel. Rather clayey at top passing, at (5.8 m) 19 ft into medium brown sand with coarse gravel. Gravel of subangular to angular black-brown and white flint.	(8.8)	29	(9.1)	30
Red Crag	(b)	Pebbly Sand. Fine to medium light red-brown and ochreous sand, becoming coarser and darker with depth. A trace of fine gravel at the top.	(4.6)	15	(13.7)	45
		Medium to coarse red-brown sand with comminuted shells.	(1.2)	4	(14.9)	49
London Clay		Blue clay.	(0.6+)	2+	(15.5)	51

					%
(a)	Gravel	6%	+16 mm	:	3
			−16 +4	:	3
	Sand	89%	−4 +1	:	4
			−1 +¼	:	52
			−¼ +1/16	:	33
	Fines	5%	−1/16	:	5
(b)	Gravel	3%	+16 mm	:	1
			−16 +4	:	2
	Sand	93%	−4 +1	:	5
			−1 +¼	:	58
			−¼ +1/16	:	30
	Fines	4%	−1/16	:	4

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 4	15	24	46	6	6	3
4 - 7	7	27	58	4	2	2
7 - 10	3	50	41	2	2	2
10 - 13	5	48	45	1	0	1
13 - 16	7	45	46	1	1	0
16 - 19	2	25	67	2	2	2
19 - 22	No grading available					
22 - 25	2	11	57	6	7	17
25 - 28	2	22	64	10	2	0
28 - 31	1	45	45	4	3	2
31 - 34	1	45	39	4	7	4
34 - 37	1	49	48	1	1	0
37 - 40	1	21	69	3	2	0
40 - 43	7	14	75	3	1	0
43 - 46	5	26	60	6	1	2
46 - 49	2	25	58	11	4	0

TM 24 NW 28 2498 4604 Martlesham, Suffolk

Surface (+ 28.7 m) + 94 ft
Water struck at (+ 18.9 m) 62 ft
Shell and auger, 6 inch diameter
July 1966

Overburden (0.8 m) 2.5 ft
Mineral (13.7 m) 45 ft
Bedrock (1.7 m +) 5.5 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
–		Soil.	(0.8)	2.5	(0.8)	2.5
Glacial Sand	(a)	Pebbly Sand. Medium sand, yellow becoming more gravelly with depth.	(3.8)	12.5	(4.6)	15
Red Crag	(b)	Sand. Fine to medium yellow brown sand.	(5.5)	18.0	(10.1)	33
		Medium yellow sand with comminuted shells.	(4.4)	14.5	(14.5)	47.5
London Clay		Grey sand underlain by a claystone at (14.9 m) 49 ft.	(0.6)	2	(15.1)	49.5
		Grey clay.	(1.1+)	3.5+	(16.2)	53

					%
(a)	Gravel	14%	+16 mm	:	4
			−16 +4	:	10
	Sand	81%	−4 +1	:	6
			−1 +¼	:	50
			−¼ +1/16	:	25
	Fines	5%	−1/16	:	5
(b)	Gravel	3%	+16 mm	:	0
			−16 +4	:	3
	Sand	95%	−4 +1	:	13
			−1 +¼	:	43
			−¼ +1/16	:	39
	Fines	2%	−1/16	:	2

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
0 - 5	No grading available					
5 - 10	0	24	70	4	2	0
10 - 15	10	27	29	8	18	8
15 - 20	5	38	51	3	2	1
20 - 25	No grading available					
25 - 30	2	59	28	9	2	0
30 . 33	3	37	38	20	2	0
33 - 35	0	16	57	22	5	0
35 - 37	No grading available					
37 - 40	1	35	43	19	2	0
40 - 42	No grading available					
42 - 45	1	33	38	21	5	2
45 - 47.5	0	31	54	13	2	0

TM 24 NW 29 2427 4595 Martlesham, Suffolk

Surface (+ 28.0 m) + 92 ft
Water struck at (+ 18.9 m) + 62 ft
Shell and auger, 6 inch diameter
July 1966

Overburden (0.8 m) 2.5 ft
Mineral (13.7 m) 45 ft
Bedrock (1.4 m +) 4.5 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.8)	2.5	(0.8)	2.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium pale yellow sand with gravel at base.	(3.2)	10.5	(4.0)	13
Red Crag	(b)	Sand. Fine to medium yellow-brown sand.	(5.9)	19.5	(9.9)	32.5
		Fine to medium yellow sand with comminuted shells. Gravelly towards base.	(4.6)	15	(14.5)	47.5
London Clay		Grey clay and claystone.	(1.4+)	4.5+	(15.9)	52

					%
(a)	Gravel	7%	+16 mm	:	4
			-16 +4	:	3
	Sand	89%	-4 +1	:	6
			-1 +¼	:	41
			-¼ +1/16	:	42
	Fines	4%	-1/16	:	4
(b)	Gravel	3%	+16 mm	:	2
			-16 +4	:	1
	Sand	95%	-4 +1	:	8
			-1 +¼	:	44
			-¼ +1/16	:	43
	Fines	2%	-1/16	:	2

Depth below surface (ft)	Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
0 - 5	5	22	66	3	4	0
5 - 10	6	67	21	6	0	0
10 - 15	2	36	35	10	6	11
15 - 20	6	38	53	3	0	0
20 - 25	No grading available					
25 - 30	2	55	42	1	0	0
30 - 32	3	38	56	3	0	0
32 - 35	1	70	27	2	0	0
35 - 37.5	0	30	50	12	5	3
37.5 - 40	No grading available					
40 - 42.5	1	42	40	17	0	0
42.5 - 45	No grading available					
45 - 47.5	1	28	42	17	3	9

TM 24 NW 30 2492 4601 Martlesham, Suffolk

Surface (+ 26.8 m) + 88 ft
Water struck at (+ 20.7 m) + 68 ft
Shell and auger, 6 inch diameter
August 1966

Overburden (0.3 m) 1 ft
Mineral (7.9 m) 26 ft
Bedrock (1.5 m +) 5 ft +

		Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Medium yellow sand with gravel.	(2.4)	8	(2.7)	9
Red Crag	(b)	Pebbly Sand. Fine to medium yellow sand.	(3.1)	10	(5.8)	19
		Fine to medium yellow sand with shell fragments. Bottom (0.6 m) 2 ft very silty.	(2.4)	8	(8.2)	27
London Clay		Brown clay changing to grey.	(1.5+)	5+	(9.7)	32

				%	Depth below surface (ft)	Percentages Fines $-\frac{1}{16}$	Sand $+\frac{1}{16}-\frac{1}{4}$	Sand $+\frac{1}{4}-1$	Sand $+1-4$	Gravel $+4-16$	Gravel $+16$
(a)	Gravel	17%	+16 mm	5	0 - 5	4	35	34	11	12	4
			−16 +4	12	5 - 10	7	18	42	15	12	6
	Sand	77%	−4 +1	13							
			−1 $+\frac{1}{4}$	38							
			$-\frac{1}{4}$ $+\frac{1}{16}$	26							
	Fines	6%	$-\frac{1}{16}$	6							
(b)	Gravel	5%	+16 mm	1	10 - 15	0	28	50	20	2	0
			−16 +4	4	15 - 20	0	48	34	13	5	0
					20 - 25	3	28	51	9	6	3
	Sand	94%	−4 +1	14	25 - 27	Over 40% fines					
			−1 $+\frac{1}{4}$	45							
			$-\frac{1}{4}$ $+\frac{1}{16}$	35							
	Fines	1%	$-\frac{1}{16}$	1							

TM 24 NW 31 2398 4501 Martlesham, Suffolk

Surface (+ 26.8 m) + 88 ft
Water struck at (+ 17.7 m) + 58 ft
Shell and auger, 6 inch diameter
July 1966

Overburden (0.5 m) 1.5 ft
Mineral (13.3 m) 43.5 ft
Bedrock (0.9 m +) 3 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	(a)	Sand. Medium pale yellow sand with a trace of gravel.	(3.2)	10.5	(3.7)	12
Red Crag	(b)	Pebbly Sand. Fine to medium yellow-brown sand.	(5.5)	18	(9.2)	30
		Medium yellow sand with shell fragments.	(4.6)	15	(13.7)	45
London Clay		Grey clay.	(0.9+)	3+	(14.6)	48

(a) Gravel 4% +16 mm : 1
−16 +4 : 3

Sand 96% −4 +1 : 7
−1 +¼ : 68
−¼ +1/16 : 21

Fines 0% −1/16 : 0

(b) Weighted means.

Gravel 6% +16 mm : 3
−16 +4 : 3

Sand 91% −4 +1 : 18
−1 +¼ : 43
−¼ +1/16 : 30

Fines 3% −1/16 : 3

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
0 - 5	0	30	69	1	0	0
5 - 10	0	11	68	13	6	2
10 - 15	7	37	8	10	8	0
15 - 20	7	41	42	8	2	0
20 - 25	1	22	46	29	2	0
25 - 30	0	46	29	24	1	0
30 - 32.5	3	5	65	25	2	0
32.5 - 35	No grading available					
35 - 37.5	1	28	55	14	2	0
37.5 - 40	3	20	52	22	2	1
40 - 42.5	No grading available					
42.5 - 45	2	20	32	10	5	31

TM 24 NE 10 2535 4956 Hasketon, Suffolk

Surface level (+ 34.1 m) + 112 ft
Water struck at (+ 18.3 m) + 60 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (5.8m) 19.5 ft
Mineral (18.5 m +) 60.5 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Boulder Clay		Brown chalky boulder clay	(1.5)	5	(1.8)	6
		Sand, pale brown, coarse with gravel. Gravel : flint and chalk pebbles.	(1.2)	4	(3.0)	10
		Silt, pale brown, with some gravel (68% fines)	(0.9)	3	(3.9)	13
		Brown chalky boulder clay, with ochreous staining.	(1.9)	6.5	(5.8)	19.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, mainly fine to medium, pale yellow to brown, with some gravel. Gravel, subrounded brown and black flint, rounded white quartz and quartzite.	(6.3)	20.5	(12.1)	40
Red Crag	(b)	Sand. Sand, fine to medium, orange-brown, occasional pebbles of flint and quartz. Iron nodules in places.	(3.4)	11	(15.5)	51
		Sand, red-brown, with shell fragments.	(8.8+)	29+	(24.4)	80

					%
(a)	Gravel	6%	+16 mm	:	2
			−16 +4	:	4
	Sand	88%	−4 +1	:	4
			−1 +¼	:	48
			−¼ +1/16	:	36
	Fines	6%	−1/16	:	6
(b)	Gravel	2%	+16 mm	:	0
			−16 +4	:	2
	Sand	94%	−4 +1	:	8
			−1 +¼	:	46
			−¼ +1/16	:	40
	Fines	4%	−1/16	:	4

Depth below surface (ft)	Fines	Sand			Gravel	
	−1/16	+1/16 −¼	+¼ −1	+1 −4	+4 −16	+16
19.5 - 22	7	50	35	5	2	1
22 - 25	6	44	43	4	3	0
25 - 28	12	24	50	6	6	2
28 - 31	4	13	58	5	11	9
31 - 34	5	67	26	1	1	0
34 - 37	5	29	59	4	1	2
37 - 40	2	23	65	6	2	2
40 - 43	4	29	57	5	5	0
43 - 46	4	56	36	2	1	0
46 - 49	3	70	23	2	2	0
49 - 52	2	51	40	6	1	0
52 - 55	5	31	54	9	1	0
55 - 58	1	28	54	15	2	1
58 - 61	3	27	62	5	2	1
61 - 64	6	33	45	14	2	0
64 - 67	5	33	45	15	2	0
67 - 70	5	38	46	9	2	0
70 - 73	5	35	52	6	2	0
73 - 76	4	31	61	2	2	0
76 - 80	4	38	48	8	2	0

TM 24 NE 11 2580 4835 Woodbridge, Suffolk

Surface level (+ 36.3 m) + 119 ft
Water struck at (+ 18.0 m) + 59 ft
Wirth B1, 6 inch diameter
May 1969

Overburden (1.2 m) 4 ft
Mineral (22.3 m +) 73 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.3)	1	(0.3)	1
Boulder Clay	Brown chalky boulder clay.	(0.9)	3	(1.2)	4
Glacial Sand and Gravel (a)	Pebbly Sand. Sand, mainly medium yellow to yellow-brown. Gravel (most abundant in upper (4.6 m) 15 ft, rounded to sub-angular flint, rounded to subrounded quartz and quartzite. Green and yellow clay and silt between (10.4)m) 34 ft and (11.3 m) 37 ft.	(13.7)	45	(14.9)	49
Red Crag (b)	Sand. Sand, red-brown, pebbles rare.	(3.6)	11.5	(18.5)	60.5
	Sand, red-brown, with shell fragments	(5.0+)	16.5+	(23.5	77

(a) Gravel 14% +16 mm : 6
-16 +4 : 8
Sand 81% -4 +1 : 7
-1 +¼ : 49
-¼ +1/16 : 25
Fines 5% -1/16 : 5

(b) Gravel 1% +16 mm : 0
-16 +4 : 1
Sand 92% -4 +1 : 4
-1 +¼ : 38
-¼ +1/16 : 50
Fines 7% -1/16 : 7

Depth below surface (ft)	Percentages Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
4 - 7	9	7	33	14	18	19
7 - 10	5	12	45	9	13	16
10 - 13	4	17	55	7	11	6
13 - 16	0	14	50	11	8	17
16 - 19	3	12	56	11	11	7
19 - 22	2	20	56	7	8	7
22 - 25	7	21	51	8	11	2
25 - 28	8	54	33	2	3	0
28 - 31	8	33	45	6	5	3
31 - 34	No grading available					
34 - 37	9	34	39	6	9	3
37 - 40	3	21	72	2	1	1
40 - 43	4	14	69	4	7	2
43 - 46	3	20	57	7	10	3
46 - 49	5	65	24	3	3	0
49 - 52	6	61	28	3	1	1
52 - 55	7	70	20	1	1	1
55 - 58	13	65	15	4	2	1
58 - 61	8	41	45	4	2	0
61 - 64	8	38	46	7	1	0
64 - 67	6	37	50	4	1	0
67 - 70	7	40	47	5	1	0
70 - 73	2	49	45	2	2	0
73 - 77	5	47	44	3	1	0

TM 24 NE 12 2551 4632 Martlesham, Suffolk

Surface level (+ 28.7 m) + 94 ft
Groundwater conditions not recorded
Wirth B1, 8 inch diameter
December 1968

Overburden (0.3 m) 1 ft.
Mineral (10.7 m) 35 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sand. Sand : predominantly fine to medium; yellow, occasional flint pebbles.	(3.7)	12	(4.0)	13
Red Crag	(b)	"Clayey" Sand. Sand : mainly fine to medium, red-brown to dark brown, occasional pebbles.	(3.6)	12	(7.6)	25
		Sand : red-brown, with shell fragments, occasional pebbles.	(3.4)	11	(11.0)	36
London Clay		Brown to blue-grey clay.	(0.6+)	2+	(11.6)	38

					%	Depth below surface (ft)	Fines	Sand			Gravel	
							$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel	2%	+16 mm	:	1	1 - 4	5	65	29	0	1	0
			−16 +4	:	1	4 - 7	5	40	52	2	1	0
						7 - 10	6	35	55	3	0	1
	Sand	92%	−4 +1	:	2	10 - 13	6	28	56	3	3	4
			−1 $+\frac{1}{4}$	:	48							
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	42							
	Fines	6%	$-\frac{1}{16}$	:	6							
(b)	Gravel	4%	+16 mm	:	1	13 - 16	10	56	25	4	4	1
			−16 +4	:	3	16 - 19	7	28	55	3	2	5
						19 - 22	8	39	47	5	1	0
	Sand	85%	−4 +1	:	7	22 - 25	6	43	43	5	3	0
			−1 $+\frac{1}{4}$	:	43	25 - 28	15	32	39	10	4	0
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	35	28 - 31	11	34	47	5	3	0
						31 - 34	24	19	43	10	4	0
	Fines	11%	$-\frac{1}{16}$	:	11	34 - 36	6	30	50	11	3	0

TM 24 NE 13 2516 4538 Martlesham, Suffolk

Surface level (+ 25.6 m) + 84 ft
Water struck at (+ 15.2 m) + 50 ft
Shell and auger, 6 inch diameter
August 1966

Overburden (0.5 m) 1.5 ft
Mineral (16.4 m) 53.5 ft
Bedrock (0.9 m +) 3 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand : yellow-brown, with gravel.	(5.9)	19.5	(6.4)	21
Red Crag	(b)	"Clayey" Sand. Sand : brown.	(2.4)	8	(8.8)	29
		Sand : brown, shelly.	(8.0)	26	(16.8)	55
London Clay		Brown clay.	(0.9+)	3+	(17.7)	58

			%	Depth below surface (ft)	Percentages Fines $-^1/_{16}$	Sand $+^1/_{16}-^1/_4$	Sand $+^1/_4-1$	Sand +1-4	Gravel +4-16	Gravel +16
(a)	Gravel	11% +16 mm :	2	0 - 5	2	24	63	4	4	3
		-16 +4 :	9	5 - 10	3	21	49	9	16	2
				10 - 15	3	20	57	12	8	0
	Sand	84% -4 +1 :	9	15 - 20	12	15	49	13	8	3
		-1 $+^1/_4$:	55							
		$-^1/_4$ $+^1/_{16}$:	20							
	Fines	5% $-^1/_{16}$:	5							
(b)	Gravel	4% +16 mm :	1	20 - 25	14	34	40	12	0	0
		-16 +4 :	3	25 - 30	18	37	46	9	0	0
				30 - 35	11	37	37	15	0	0
	Sand	85% -4 +1 :	15	35 - 40	No grading available					
		-1 $+^1/_4$:	36	40 - 45	0	27	31	25	12	5
		$-^1/_4$ $+^1/_{16}$:	34	45 - 55	No grading available					
	Fines	11% $-^1/_{16}$:	11		Means (b) based on 4 samples only					

TM 24 NE 15 2617 4641 Martlesham, Suffolk

Surface level (+ 26.0 m) + 85 ft
Groundwater conditions not recorded
Wirth B1, 8 inch diameter
January 1969

Overburden (0.3 m) 1 ft
Mineral (7.3 m) 24 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand	(a)	Sandy Gravel. Sand : mainly medium; yellow brown or red-brown. Gravel : subangular to subrounded flints.	(1.8)	6	(2.1)	7
Red Crag	(b)	Sand. Sand : mainly fine to medium, red to red-brown. Occsional pebbles of black flint, mainly rounded.	(2.8)	9	(4.9)	16
		Sand : mainly fine to medium, red, shell fragments abundant. Phosphatic pebbles, mainly rounded, at base.	(2.7)	9	(7.6)	25
London Clay		Clay.	(0.6+)	2+	(8.2)	27

					%
(a)	Gravel	30%	+16 mm	:	3
			−16 +4	:	27
	Sand	68%	−4 +1	:	17
			−1 +¼	:	41
			−¼ +1/16	:	10
	Fines	2%	−1/16	:	2
(b)	Gravel	4%	+16 mm	:	1
			−16 +4	:	3
	Sand	91%	−4 +1	:	13
			−1 +¼	:	50
			−¼ +1/16	:	28
	Fines	5%	−1/16	:	5

Gradings available only for 1 to 4 ft; results as on left

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
7 - 10	5	28	54	7	3	1
10 - 13	4	48	40	12	0	1
13 - 16	5	23	56	10	4	2
16 - 19	No grading available					
19 - 22	3	28	48	18	2	1
22 - 25	5	23	50	18	4	0

TM 24 NE 16 2611 4585 Martlesham, Suffolk

Surface level (+ 24.1 m) + 79 ft
Water struck at (+ 20.4 m) + 67 ft
Shell and auger, 6 inch diameter
October 1966

Overburden (0.6 m) 2 ft
Mineral (7.6 m) 25 ft
Bedrock (0.9 m +) 3 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, yellow-brown, with gravel.	(2.8)	9	(3.4)	11
Red Crag	(b)	Sand. Sand, brown.	(2.7)	9	(6.1)	20
		Sand, brown with shell fragments.	(2.1)	7	(8.2)	27
London Clay		Grey clay.	(0.9+)	3+	(9.1)	30

					%	Depth below surface (ft)	Fines	Sand			Gravel	
							$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel	23%	+16 mm	:	9%	0 - 5	3	23	36	16	13	9
			−16 +4	:	14	5 - 10	7	37	28	5	15	8
	Sand	72%	−4 +1	:	10							
			−1 $+\frac{1}{4}$	:	32							
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	30							
	Fines	5%	$-\frac{1}{16}$	:	5							
(b)	Gravel	3%	+16 mm	:	1	10 - 15	3	25	65	5	1	1
			−16 +4	:	2	15 - 20	7	24	64	5	0	0
						20 - 25	1	22	59	15	3	0
	Sand	94%	−4 +1	:	10	25 - 27	1	13	59	19	6	2
			−1 $+\frac{1}{4}$	:	62							
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	22							
	Fines	3%	$-\frac{1}{16}$	:	3							

TM 24 NE 17 2600 4516 Martlesham, Suffolk

Surface level (+ 25.3 m) + 83 ft
Water struck at (+ 12.8 m) + 42 ft
Shell and auger, 6 inch diameter
October 1966

Overburden (0.5 m) 1.5 ft
Mineral (17.5 m) 57.5 ft
Bedrock (0.9 m +) 3 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, yellow to brown, with gravel.	(4.1)	13.5	(4.6)	15
Red Crag	(b)	Sand. Sand, red-brown.	(4.8)	16	(9.4)	31
		Sand, red-brown, with shell fragments.	(8.6)	28	(18.0)	59
London Clay		Blue clay.	(0.9+)	3+	(18.9)	62

					%
(a)	Gravel	23%	+16 mm	:	6
			−16 +4	:	17
	Sand	73%	−4 +1	:	21
			−1 +¼	:	34
			−¼ +1/16	:	18
	Fines	4%	−1/16	:	4
(b)	Gravel	3%	+16 mm	:	0
			−16 +4	:	3
	Sand	92%	−4 +1	:	14
			−1 +¼	:	52
			−¼ +1/16	:	26
	Fines	5%	−1/16	:	5

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
0 - 5	5	15	40	14	19	7
5 - 10	3	14	27	29	21	6
10 - 15	4	28	37	15	11	5
15 - 20	6	39	44	3	8	0
20 - 25	No grading available					
25 - 30	8	40	49	3	0	0
30 - 35	No grading available					
35 - 40	6	19	59	14	2	0
40 - 45	2	8	54	32	4	0
45 - 50	No grading available					
50 - 55	1	25	53	20	1	0
55 - 59	No grading available					

Means (b) based on 5 samples only

TM 24 NE 18 2700 4508 Martlesham, Suffolk

Surface level (+ 25.3 m) + 83 ft
Water struck at (+ 14.0 m) + 46 ft
Shell and auger, 6 inch diameter
October 1966

Overburden (0.3 m) 1 ft
Mineral (11.0 m) 36 ft
Bedrock (1.2 m +) 4 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand	(a)	Pebbly Sand. Sand, mainly medium, yellow to brown, with gravel.	(5.8)	19	(6.1)	20
Red Crag	(b)	Sand. Sand, brown.	(0.6)	2	(6.7)	22
		Sand, yellow to brown, shelly.	(4.6)	15	(11.3)	37
London Clay		Brown to blue-grey clay.	(1.2+)	4+	(12.5)	41

					%
(a)	Gravel	13%	+16 mm	:	3
			−16 +4	:	10
	Sand	81%	−4 +1	:	16
			−1 +¼	:	51
			−¼ +1/16	:	14
	Fines	6%	−1/16	:	6
(b)	Gravel	1%	+16 mm	:	0
			−16 +4	:	1
	Sand	92%	−4 +1	:	9
			−1 +¼	:	52
			−¼ +1/16	:	31
	Fines	7%	−1/16	:	7

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 5	10	11	56	12	7	4
5 - 10	5	15	51	17	10	2
10 - 15	5	14	53	16	9	3
15 - 20	5	14	46	20	13	2
20 - 25	8	42	43	6	1	0
20 - 25	8	42	43	6	1	0
25 - 30	No grading available					
30 - 35	7	21	59	12	1	0
35 - 37	No grading available					

Means (b) based on 2 samples only

TM 24 NE 20 2747 4548 Martlesham, Suffolk

Surface level (+ 23.5 m) + 77 ft
Water struck at (+ 15.2 m) + 50 ft
Wirth B1, 8 inch diameter
January 1969

Overburden (0.3 m) 1 ft
Mineral (9.1 m) 30 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand ; pale brown to brown, mainly medium. Gravel : subrounded to angular flints, up to (100 mm) 4 ins with subrounded to rounded quartz and quartzite.	(4.6)	15	(4.9)	16
Red Crag	(b)	Pebbly Sand. Sand : brown to dark brown or red-brown, mainly fine to medium. Occasional pebbles.	(3.4)	11	(8.3)	27
		Sand : brown, fine to medium, with shell fragments. Occasional pebbles.	(1.2)	4	(9.5)	31
London Clay		Blue-grey clay.	(0.6+)	2+	(10.1)	33

				%	Depth below surface (ft)	Fines	Sand			Gravel	
						$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1-4	+4-16	+16
(a)	Gravel	20%	+16 mm	8	1 - 4	4	36	40	10	5	5
			-16 +4	12	4 - 7	5	15	45	15	13	7
					7 - 10	5	10	53	13	14	5
	Sand	75%	-4 +1	13	10 - 13	6	9	37	16	22	10
			-1 $+\frac{1}{4}$	45	13 - 16	5	15	49	10	8	13
			$-\frac{1}{4}$ $+\frac{1}{16}$	17							
	Fines	5%	$-\frac{1}{16}$	5							
(b)	Gravel	5%	+16 mm	1	16 - 19	4	76	14	3	3	0
			-16 +4	4	19 - 21	9	34	45	7	2	1
					21 - 24	9	35	42	6	5	3
	Sand	86%	-4 +1	8	24 - 27	15	12	58	10	4	1
			-1 $+\frac{1}{4}$	36	27 - 29	5	45	35	10	4	1
			$-\frac{1}{4}$ $+\frac{1}{16}$	42	29 - 31	10	47	28	10	5	0
	Fines	9%	$-\frac{1}{16}$	9							

TM 24 NE 22 2892 4928 Sutton Hoo, Suffolk

Surface level (+ 31.1 m) + 102 ft
Water not struck
Wirth B1, 6 inch diameter
September 1969

Mineral (23.2 m) 76 ft
Bedrock (0.6 +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, yellow to pale Brown, mainly fine to medium. Occasional gravel: angular flints and rounded white quartzites.	(9.1)	30	(9.1)	30
Red Crag	(b)	Sand. Sand, green in first foot, then red-brown; fine to medium. Occasional pebbles. No shells.	(14.1)	46	(23.2)	76
London Clay		Blue-grey clay.	(0.6+)	2+	(23.8)	78

					%
(a)	Gravel	6%	+16 mm	:	4
			−16 +4	:	2
	Sand	90%	−4 +1	:	3
			−1 +¼	:	58
			−¼ +1/16	:	29
	Fines	4%	−1/16	:	4
(b)	Gravel	3%	+16 mm	:	1
			−16 +4	:	2
	Sand	91%	−4 +1	:	3
			−1 +¼	:	55
			−¼ +1/16	:	33
	Fines	6%	−1/16	:	6

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
0 - 3	Grading not available					
3 - 6	10	20	55	11	3	1
6 - 9	3	27	50	5	8	7
9 - 12	4	23	50	8	5	0
12 - 15	4	31	59	2	3	1
15 - 18	7	50	39	2	1	1
18 - 21	3	42	42	1	2	0
21 - 24	2	28	63	3	3	1
24 - 27	3	23	63	6	4	1
27 - 30	5	15	66	7	4	3
30 - 33	No grading available					
33 - 36	5	39	48	4	3	1
36 - 39	6	34	54	2	2	2
39 - 42	5	25	61	5	2	2
42 - 45	5	25	65	1	2	2
45 - 48	7	30	58	3	2	0
48 - 51	5	28	59	5	3	0
51 - 54	6	44	45	2	3	0
54 - 57	4	31	61	3	1	0
57 - 60	5	40	50	2	2	1
60 - 63	6	34	54	4	1	1
63 - 66	4	31	59	3	3	0
66 - 71	5	35	54	3	1	0
71 - 76	6	34	51	7	1	1

TM 24 NE 23 2834 4820 Sutton Hoo, Suffolk

Surface level (+ 28.3 m) + 93 ft
Water struck at (+ 14.6 m) + 48 ft
Elmat E2, 6 inch diameter to 60 ft
then 1½ inch
August 1969

Mineral (22.3 m +) 73 +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, mainly fine to medium, brown or orange-brown. Gravel, most abundant between (7.3 m) 24 ft and (9.1 m) 30 ft; rounded to subrounded white quartz, black and brown flints. Occasional thin layers of silty clay throughout unit.	(10.4)	34	(10.4)	34
Red Crag	(b)	Sand. Sand, mainly medium, brown to dark brown. Occasional pebbles.	(5.4)	17.5	(15.8)	51.5
		Sand, brown, abundant shett fragments.	(6.5+)	21.5+	(22.3)	73

					%	Depth below surface (ft)	Fines	Sand			Gravel	
							−1/16	+1/16 −1/4	+1/4 −1	+1−4	+4−16	+16
(a)	Gravel	6%	+16 mm	:	2	0 - 3	4	36	50	2	1	1
			−16 +4	:	4	3 - 6	3	42	51	1	1	2
						6 - 9	9	56	33	1	1	0
	Sand	88%	−4 +1	:	5	9 - 12	5	15	75	2	2	1
			−1 +1/4	:	49	12 - 15	2	20	67	6	3	2
			−1/4 +1/16	:	34	15 - 18	12	28	52	3	5	0
						18 - 21	2	18	44	12	18	6
	Fines	6%	−1/16	:	6	21 - 24	3	29	48	10	7	3
						24 - 27	2	8	75	5	9	1
						27 - 30	8	30	47	8	6	1
						30 - 33	15	70	11	1	1	2
						33 - 36	9	28	48	13	1	1
(b)	Gravel	3%	+16 mm	:	0	36 - 39	10	37	40	11	2	0
			−16 +4	:	3	39 - 42	6	26	54	10	4	0
						42 - 45	11	24	55	8	1	1
	Sand	88%	−4 +1	:	18	45 - 48	9	36	49	5	1	0
			−1 +1/4	:	45	48 - 51	21	26	40	12	1	0
			−1/4 +1/16	:	25	51 - 54	9	16	48	24	2	1
						54 - 57	6	11	40	38	5	0
	Fines	9%	−1/16	:	9%	57 - 60	5	12	40	33	8	2
						60 - 73	No samples taken					

TM 24 NE 24 2839 4754 Sutton, Suffolk

Surface level (+ 24.1 m) + 79 ft
Water struck at (+ 11.9 m) + 39 ft
Elmat E2, 6 inch diameter to 49 ft, then 1½ inch
August 1969

Mineral (15.8 m) 52 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, medium to coarse, red-brown; (0.9 m) 3 ft of fine-medium red and yellow sand, with a little silt, between (2.1 m) 7 ft and (3.0 m) 10 ft. Gravel, subangular to irregular flints up to (75 mm) 3 ins subrounded quartz, quartzite and jasper up to (25 mm) 1 in.	(4.3)	14	(4.3)	14
Chillesford Beds	(b)	Sand. Sand, predominantly fine; clayey, with silt. Green between (4.3 m) 14 ft and (7.0 m) 23 ft; then bright red. Micaceous. Occasional carbonaceous patches, also ironstone bands and nodules.	(3.6)	12	(7.9)	26
Red Crag	(c)	Sand. Sand, red, fine to medium, some silt.	(3.4)	11	(11.3)	37
		Sand, medium-coarse, red, with up to 40% shell fragments. Up to 15% rounded phosphatic nodules and coprolites between (14.0 m) 46 ft and (14.9 m) 49 ft.	(4.5)	15	(15.8)	52
London Clay		Blue-grey clay.	(0.6+)	2+	(16.4)	54

					%
(a)	Gravel	14%	+16 mm	:	4
			−16 +4	:	10
	Sand	83%	−4 +1	:	7
			−1 +¼	:	54
			−¼ +1/16	:	22
	Fines	3%	−1/16	:	3
(b)	Gravel	3%	+16 mm	:	1
			−16 +4	:	2
	Sand	92%	−4 +1	:	7
			−1 +¼	:	40
			−¼ +1/16	:	45
	Fines	5%	−1/16	:	5
(c)	Gravel	3%	+16 mm	:	1
			−16 +4	:	2
	Sand	92%	−4 +1	:	6
			−1 +¼	:	59
			−¼ +1/16	:	27
	Fines	5%	−1/16	:	5

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
3 - 6	4	11	40	10	22	13
6 - 9	3	7	54	3	3	0
9 - 12	0	7	75	8	5	5
12 - 15	5	32	45	7	11	0
17 - 20	6	46	39	7	2	0
20 - 23	4	61	30	4	0	1
23 - 26	4	31	51	10	4	1
26 - 29	6	40	49	1	3	1
29 - 32	6	39	51	2	2	0
32 - 35	5	52	41	1	1	0
35 - 38	6	38	51	4	0	0
38 - 41	No grading available					
41 - 44	4	15	55	20	2	2
44 - 52	No grading available					

TM 24 NE 25 2854 4695 Sutton, Suffolk

Surface level (+ 21.6 m) + 71 ft
Water struck at (+ 14.0 m) + 46 ft
Wirth B1, 6 inch diameter
June 1969

Overburden (0.3 m) 1 ft
Mineral (8.8 m) 29 ft
Bedrock (1.2 m +) 4 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel (a)	Pebbly Sand. Sand, pale brown, mainly medium becoming clayey downwards. Gravel subrounded brown and black flints.	(1.8)	6	(2.1)	7
Red Crag (b)	Sand. Sand, orange, pale brown to chocolate, and red-brown, mainly fine to medium. Occasional pebbles	(5.5)	18	(7.6)	25
	Sand, red brown, with up to 30% shell fragments.	(1.5)	5	(9.1)	30
London Clay	Brown clay.	(0.6)	2	(9.7)	32
	Blue clay	(0.5+)	2+	(10.3)	34

				%	Depth below surface (ft)	Fines	Sand			Gravel	
						−1/16	+1/16−1/4	+1/4−1	+1−4	+4−16	+16
(a)	Gravel 13%	+16 mm	:	6	1 - 4	2	11	73	6	5	3
		−16 +4	:	7	4 - 7	9	20	43	10	9	9
	Sand 82%	−4 +1	:	8							
		−1 +1/4	:	58							
		−1/4 +1/16	:	16							
	Fines 5%	−1/16	:	5							
(b)	Gravel 3%	+16 mm	:	1	7 - 10	7	25	61	6	1	0
		−16 +4	:	2	10 - 13	8	13	67	9	1	2
					13 - 16	8	25	60	5	2	0
	Sand 91%	−4 +1	:	9	16 - 19	6	31	55	6	2	0
		−1 +1/4	:	53	19 - 22	5	44	44	5	2	0
		−1/4 +1/16	:	29	22 - 25	7	28	55	7	3	0
					25 - 28	5	40	38	13	3	1
	Fines 6%	−1/16	:	6	28 - 30	5	23	48	16	7	0

TM 24 NE 26 2974 4910 Sutton, Suffolk

Surface level (+ 29.3 m) + 96 ft
Water struck at (+ 13.7 m) + 45 ft
Elmat E2, 6 inch diameter
August 1969

Overburden (0.2 m) 0.5 ft
Mineral (21:2+) 69.5+

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.2)	0.5	(0.2)	0.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Occasional thin layers of silt and silty clay. Gravel most abundant in lower (3.7 m) 12 ft. Sand, mainly fine to medium in top (6.4 m) 21 ft; higher percentage of coarse sand in lower (3.7 m) 12 ft; yellow, brown and orange. Gravel, rounded to subrounded brown, black red and white flints in coarse fraction, rounded quartz and quartzite in fine. Cobbles up to (100 mm) 4 inches in diameter.	(9.9)	32.5	(10.1)	33
Red Crag	(b)	Sand. Sand, mainly fine to medium brown to orange brown. Occasional pebbles.	(2.1)	7	(12.2)	40
		Sand, brown, with abundant shell fragments.	(9.2+)	30+	(21.4)	70

				%
(a)	Gravel	11%	+16 mm :	4
			−16 +4 :	7
	Sand	86%	−4 +1 :	6
			−1 +¼ :	49
			−¼ +1/16 :	31
	Fines	3%	−1/16 :	3
(b)	Gravel	3%	+16 mm :	0
			−16 +4 :	3
	Sand	91%	−4 +1 :	5
			−1 +¼ :	56
			−¼ +1/16 :	30
	Fines	6%	−1/16 :	6

Depth below surface (ft)	Fines	Sand			Gravel	
	−1/16	+1/16−¼	+¼−1	+1−4	+4−16	+16
0.5 - 3	6	43	32	5	12	2
3 - 6	3	28	59	3	5	2
6 - 9	2	31	58	5	4	1
9 - 12	1	36	59	1	2	1
12 - 15	3	63	32	0	1	1
15 - 18	3	36	57	1	2	1
18 . 21	4	33	55	3	3	2
21 - 24	1	28	42	14	11	4
24 - 27	3	25	39	15	12	6
27 - 30	3	15	58	7	9	8
30 - 33	3	6	51	12	13	15
33 - 36	7	44	40	4	3	2
36 - 39	No grading available					
39 - 42	7	45	43	4	1	0
42 - 45	6	41	41	11	1	0
45 - 48	8	26	57	8	1	0
48 - 51	7	36	54	1	2	0
51 - 54	7	30	58	4	1	0
54 - 57	4	52	40	3	1	0
57 - 60	6	20	59	7	8	0
60 - 62	2	19	67	9	3	0
62 - 70	No samples taken					

TM 24 NE 27 2946 4843 Sutton Hoo, Suffolk

Surface level (+ 25.6 m) + 84 ft
Water struck at (+ 14.6 m) + 48 ft
Elmat E2, 6 inch diameter to 47 ft, then 1½ inch
July 1969

Overburden (0.6 m) 2 ft
Mineral (17.7 m) 58 ft
Bedrock (0.5 m +) 1.5 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
			(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, mainly fine-medium in top (3.0 m) 10 ft; mainly medium-coarse below; yellow or red-brown. Gravel, rounded quartz and quartzite up to (25 mm) 1 inch diameter, subangular to irregular flints up to (40 mm) 1½ ins. Red-brown silty boulder clay between (2.0 m) 6.5 ft and (2.4 m) 8 ft below surface.	(6.1)	20	(6.7)	22
Chillesford Beds	(b)	Sand. Sand, predominantly fine, with silt; micaceous, laminated; yellow, brown, red-brown. Occasional layers and nodules of ironstone.	(4.3)	14	(11.0)	36
Red Crag ed	(c)	Sand. Mainly medium, red-brown, with abundant shell fragments.	(7.3)	24	(18.3)	60
London Clay		Clay	(0.5+)	1.5+	(18.8)	61.5

				%	Depth below surface (ft)	Fines	Sand			Gravel	
						$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel	18%	+16 mm :	6	2 - 5	18	44	36	1	1	0
			−16 +4 :	12	5 - 6.5	3	40	23	11	13	10
					6.5						
	Sand	77%	−4 +1 :	10	8 - 11	6	16	43	11	17	7
			−1 $+\frac{1}{4}$:	44	11 - 14	2	22	55	5	11	5
			$-\frac{1}{4}$ $+\frac{1}{16}$:	23	14 - 17	2	5	42	16	24	8
					17 - 20	2	10	52	12	16	8
	Fines	5%	$-\frac{1}{16}$:	5	20 - 22	3	21	54	13	5	4
(b)	Gravel	2%	+16 mm :	0	22 - 26	7	55	33	2	3	0
			−16 +4 :	2	26 - 29	7	60	23	6	3	1
					29 - 32	2	86	7	3	2	0
	Sand	94%	−4 +1 :	4	32 - 35	0	73	21	4	2	0
			−1 $+\frac{1}{4}$:	21							
			$-\frac{1}{4}$ $+\frac{1}{16}$:	69							
	Fines	4%	$-\frac{1}{16}$:	4							
(c)	Gravel	4%	+16 mm :	1	35 - 38	4	49	45	0	2	0
			−16 +4 :	3	38 - 41	8	14	61	11	3	3
					41 - 44	11	24	51	9	5	0
	Sand	90%	−4 +1 :	6	44 - 47	3	36	55	4	1	1
			−1 $+\frac{1}{4}$:	53	47 - 60	No samples taken					
			$-\frac{1}{4}$ $+\frac{1}{16}$:	31							
	Fines	6%	$-\frac{1}{16}$:	6							

TM 24 NE 28 2957 4752 Sutton, Suffolk

Surface level (+ 21.3 m) + 70 ft
Water struck at (+ 11.0 m) + 36 ft
Wirth B1, 6 inch diameter
June 1969

Overburden (0.3 m) 1 ft
Mineral (14.6 m +) 48 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pepply sand. nd. Sand, yellow-brown, medium, with c. 10% gravel. Gravel fine to medium, black flint and white quartz.	(1.8)	6	(2.1)	7
Red Crag	(b)	Sand. Sand, medium, dark brown, with some flint pebbles.	(1.3)	4	(3.4)	11
		Sand, medium to coarse, red-brown, shell fragments, varying from a trace to c. 40%.	(11.5+)	38+	(14.9)	49

No grading results available for this borehole.

			%	Depth below surface (ft)	Fines $-\frac{1}{16}$	Sand $+\frac{1}{16}-\frac{1}{4}$	Sand $+\frac{1}{4}-1$	Sand $+1-4$	Gravel $+4-16$	Gravel $+16$
(a)	Gravel	8%+16 mm :	3	1 - 4	No grading information available					
		-16 +4 :	5	4 - 7	3	20	63	6	3	5
	Sand	89%-4 +1 :	6							
		-1 $+\frac{1}{4}$:	63							
		$-\frac{1}{4}$ $+\frac{1}{16}$:	20							
	Fines	3%-$\frac{1}{16}$mm :	3							
(b)	Gravel	3%+16 mm :	1	7 - 10	No grading information available					
		-16 +4 :	2	10 - 13	6	22	58	11	3	0
				13 - 16	7	28	59	4	2	0
	Sand	93%-4 +1 :	14	16 - 19	7	36	45	9	3	0
		-1 $+\frac{1}{4}$:	46	19 - 22	2	18	68	9	2	0
		$-\frac{1}{4}$ $+\frac{1}{16}$:	33	22 - 25	8	33	34	22	3	0
				25 - 28	3	8	65	21	3	0
	Fines	4% - $\frac{1}{16}$:	4	28 - 31	3	50	33	11	2	1
				31 - 34	4	39	44	11	2	0
				34 - 37	3	42	43	9	2	1
				37 - 40	3	49	36	9	3	0
				1+0 - 43	2	45	30	13	4	6
				1+3 - 46	1	17	38	42	2	0
				46 - 49	2	40	44	14	0	0

TM 24 NE 29 2965 4648 Sutton, Suffolk

Surface level (+ 22.9 m) + 75 ft
Water struck at (+ 13.1 m) + 43 ft
Wirth B1, 6 inch diameter
June 1969

Overburden (0.6 m) 2 ft
Mineral (10.4 m) 34 ft
Bedrock (1.2 m +) 4 ft

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, light brown to brown, mainly medium. Gravel, mainly black or brown flint, rounded to subrounded, with occasional white quartz.	(3.4)	11	(4.0)	13
Red Crag	(b)	Sand. Sand, ochreous brown, mainly fine to medium. Occasional brown and black flint gravel.	(3.8)	12.5	(7.8)	25.5
		Sand, red-brown, with shell fragments. Occasional pebbles.	(3.2)	10.5	(11.0)	36
London Clay		Brown clay.	(1.2+)	4+	(12.2)	40

				%
(a)	Gravel	13%	+16 mm :	5
			−16 +4 :	8
	Sand	84%	−4 +1 :	18
			−1 +¼ :	53
			−¼ +1/16 :	13
	Fines	3%	−1/16 :	3
(b)	Gravel	2%	+16 mm :	0
			−16 +4 :	2
	Sand	93%	−4 +1 :	11
			−1 +¼ :	48
			−¼ +1/16 :	34
	Fines	5%	−1/16 :	5

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
2 - 4	6	21	33	26	8	6
4 - 7	2	8	61	19	8	2
7 - 10	1	5	66	18	7	3
10 - 13	2	21	50	10	10	7
13 - 16	3	29	58	6	2	2
16 - 19	4	39	47	7	2	1
19 - 22	7	42	39	11	1	0
22 - 25	8	55	35	2	0	0
25 - 28	6	31	51	10	2	0
28 - 31	5	20	59	14	2	0
31 - 34	3	22	55	18	2	0
34 - 36	6	30	47	17	1	0

TM 24 NE 30 2979 4605 Sutton, Suffolk

Surface (+ 24.1 m) + 79 ft
Water struck at (+ 13.4 m) + 44 ft
Wirth B1, 6 inch diameter
June 1969

Mineral (12.8 m) 42 ft
Bedrock (0.3 m +) 1 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, fine to medium, with some coarse, yellow to brown. Gravel, rounded brown flints with occasional quartz pebbles.	(5.0)	16.5	(5.0)	16.5
Red Crag	(b)	Sand. Sand, fine to medium, rarely coarse, dark brown. Occasional pebbles.	(4.1)	13.5	(9.1)	30
		Sand, fine to coarse, red-brown with up to 15% shell fragments.	(3.7)	12	(12.8)	42
London Clay		Blue clay.	(0.3+)	1+	(13.1)	43

				%	Depth below surface (ft)	Fines	Sand			Gravel	
						$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel	10%	+16 mm :	6	0 - 3	6	36	23	5	6	24
			−16 +4 :	4	3 - 6	7	54	29	4	2	4
					6 - 9	4	36	54	2	3	1
	Sand	84%	−4 +1 :	6	9 - 12	4	39	32	15	8	2
			−1 $+\frac{1}{4}$:	30	12 - 15	5	55	26	6	6	2
			$-\frac{1}{4}$ $+\frac{1}{16}$:	48							
	Fines	6%	$-\frac{1}{16}$:	6							
(b)	Gravel	3%	+16 mm :	0	15 - 18	12	63	17	6	1	1
			−16 +4 :	3	18 - 21	6	49	42	2	1	0
					21 - 24	6	39	48	4	2	1
	Sand	90%	−4 +1 :	9	24 - 27	5	35	53	5	2	0
			−1 $+\frac{1}{4}$:	41	27 - 30	8	47	37	5	3	0
			$-\frac{1}{4}$ $+\frac{1}{16}$:	40	30 - 33	5	48	34	10	3	0
					33 - 36	6	31	46	14	3	0
	Fines	7%	$-\frac{1}{16}$:	7	36 - 39	7	40	32	17	4	0
					39 - 42	9	36	36	16	3	0

TM 24 SW 7 2402 4400 Martlesham, Suffolk

Surface (+ 25.9 m) + 85 ft
Water struck at (+ 17.2 m) + 56.5 ft
Shell and auger, 6 inch diameter
September 1966

Overburden (0.5 m) 1.5 ft
Mineral (14.8 m) 48.5 ft
Bedrock (0.9 m +) 3 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	(a)	Sandy Gravel. Sand, mainly medium with medium to coarse gravel.	(3.8)	12.5	(4.3)	14
Red Crag	(b)	Pebbly Sand. Fine to medium dark brown sand, gravelly for the first (1.5 m) 5 ft. Then a decrease in gravel and an increase in fines. Some shell debris recorded at (8.2 m) 27 ft to (9.1 m) 30 ft.	(7.9)	26	(12.2)	40
		Medium to coarse sand with comminuted shells.	(3.1)	10	(15.3)	50
London Clay		Clay.	(0.9+)	3+	(16.2)	53

					%
(a)	Gravel	33%	+16 mm	:	19
			−16 +4	:	14
	Sand	63%	−4 +1	:	14
			−1 +¼	:	32
			−¼ +1/16	:	17
	Fines	4%	−1/16	:	4
(b)	Gravel	7%	+16 mm	:	3%
			−16 +4	:	4
	Sand	86%	−4 +1	:	17
			−1 +¼	:	47
			−¼ +1/16	:	22
	Fines	7%	−1/16	:	7

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
0 - 5	5	17	47	6	10	15
5 - 10	3	14	31	19	18	15
10 - 15	3	19	20	18	13	27
15 - 20	1	32	37	7	7	16
20 - 25	11	47	34	8	0	0
25 - 30	11	18	42	28	1	0
30 - 35	No grading available					
35 - 40	14	17	45	22	2	0
40 - 45	3	10	68	13	5	1
45 - 50	2	10	54	28	6	0

TM 24 SW 8 2361 4471 Martlesham, Suffolk

Surface (+ 27.7 m) + 91 ft
Water struck at (+ 17.4 m) + 57 ft
Shell and auger, 6 inch diameter
July 1966

Overburden (0.5 m) 1.5 ft
Mineral (14.2 m) 46.5 ft
Bedrock (1.2 m +) 4 ft +

		Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium yellow sand with medium to coarse gravel in lower (3.0 m) 10 ft.	(3.9)	13	(4.4)	14.5
Red Crag	(b)	Sand. Fine to medium yellow sand.	(6.0)	19.5	(10.4)	34
		Medium to coarse sand with comminuted shells.	(4.2)	14	(14.6)	48
London Clay		Brown clay passing into grey clay.	(1.2+)	4+	(15.8)	52

				%
(a)	Gravel	13%	+16 mm	8
			−16 +4	5
	Sand	79%	−4 +1	11
			−1 +¼	49
			−¼ +1/16	19
	Fines	8%	−1/16	8
(b)	Gravel	4%	+16 mm	2
			−16 +4	2
	Sand	91%	−4 +1	21
			−1 +¼	45
			−¼ +1/16	25
	Fines	5%	−1/16	5

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
0 - 5	3	19	66	12	0	0
5 - 10	12	20	32	9	11	16
10 - 15	5	15	47	20	10	3
15 - 20	5	32	47	16	0	0
20 - 25	No grading available					
25 - 30	9	41	46	4	0	0
30 - 35	5	22	46	27	0	0
35 - 40	No grading available					
40 - 45	1	5	39	38	8	9
45 - 48	No grading available					

TM 24 SW 9 2197 4401 Martlesham, Suffolk

Surface (+ 28.0 m) 92 ft
Water struck at (+ 18.0 m) + 59 ft
Shell and auger, 6 inch diameter
November 1966

Overburden (0.6 m) 2 ft
Mineral (14.6 m) 48 ft
Bedrock (0.9 m +) 3 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	'Clayey' Pebbly Sand. Fine to medium light brown sand with clay and some gravel. Clay in seams, mostly in the top (3.0 m) 10 ft.	(5.5)	18	(6.1)	20
Red Crag	(b)	Pebbly Sand. Dark brown fine to medium sand with fine to medium gravel.	(4.6)	15	(10.7)	35
		Medium, brown sand with comminuted shells and some gravel.	(4.5)	15	(15.2)	50
London Clay		Brown clay passing into blue clay.	(0.9+)	3+	(16.1)	53

				%
(a)	Gravel	11%	+16 mm :	5
			−16 +4 :	6
	Sand	76%	−4 +1 :	10
			−1 +¼ :	45
			−¼ +1/16 :	21
	Fines	13%	−1/16 :	13
(b)	Gravel	13%	+16 mm :	6
			−16 +4 :	7
	Sand	87%	−4 +1 :	12
			−1 +¼ :	36
			−¼ +1/16 :	39
	Fines	0%	−1/16 :	0

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
0 - 5	25	30	23	9	6	7
5 - 10	25	17	33	10	9	6
10 - 15	2	23	55	10	5	5
15 - 20	0	15	70	10	4	1
20 - 25	0	32	48	5	7	8
25 - 30	No grading available					
30 - 35	0	65	20	7	6	2
35 - 40	0	24	40	21	7	8
40 - 45	No grading available					
45 - 50	0	35	38	14	8	5

TM 24 SW 10 2109 4471 Martlesham, Suffolk

Surface (+ 34.4 m) + 113 ft
Water struck at (+ 24.4 m) + 80 ft
Shell and auger, 6 inch diameter
November 1966

Overburden (0.5 m) 1.5 ft
Mineral (17.8 m) 58.5 ft
Bedrock (0.6 m +) 2 ft +

		Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		(0.5)		1.5	(0.5)	1.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Medium brown sand with fine to medium gravel.	(8,0)	26.5	(8.5)	28
Red Crag	(b)	Pebbly Sand. Brown sand, medium.	(1.3)	4	(9.8)	32
		Brown sand with comminuted shells.	(8.5)	28	(18.3)	60
London Clay		Brown clay passing into blue clay.	(0.6+)	2+	(18.9)	62

				%
(a)	Gravel	20%	+16 mm :	8
			−16 +4 :	12
	Sand	79%	−4 +1 :	10
			−1 +¼ :	48
			−¼ +1/16 :	21
	Fines	1%	−1/16 :	1
(b)	Gravel	8%	+16 mm :	2
			−16 +4 :	6
	Sand	92%	−4 +1 :	16
			−1 +¼ :	56
			−¼ +1/16 :	20
	Fines	0%	−1/16 :	0

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
0 - 5	3	22	52	7	3	13
5 - 10	0	65	19	1	16	5
10 - 15	0	6	60	10	13	11
15 - 20	0	4	64	7	15	10
20 - 25	4	13	43	20	16	4
25 - 30	1	15	49	18	13	4
30 - 35	0	12	58	20	8	2
35 - 40	No grading available					
40 - 45	0	24	57	11	5	3
45 - 55	No grading available					
55 - 60	0	25	54	17	4	0

TM 24 SW 11 2115 4405 Martlesham, Suffolk

Surface (+ 33.8 m) 111 ft
Water struck at (+ 18.0 m) + 59 ft
Shell and auger, 6 inch diameter
October 1966

Overburden (1.1 m) 3.5 ft
Mineral (19.7 m) 64.5 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(1.1)	3.5	(1.1)	3.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium sand with medium to coarse gravel. High percentage of fines in the top (4.6 m) 15 ft.	(7.4)	24.5	(8.5)	28
Red Crag	(b)	Pebbly Sand. Fine to medium brown sand.	(4.3)	14	(12.8)	42
		Fine to medium brown sand with comminuted shells, and some gravel.	(7.9)	26	(20.7)	68
London Clay		Clay.	(0.6+)	2+	(21.3)	70

				%
(a)	Gravel	17%	+16 mm :	8
			−16 +4 :	9
	Sand	77%	−4 +1 :	9
			−1 +¼ :	42
			−¼ +1/16 :	26
	Fines	6%	−1/16 :	6
(b)	Gravel	9%	+16 mm :	2
			−16 +4 :	7
	Sand	89%	−4 +1 :	13
			−1 +¼ :	49
			−¼ +1/16 :	27
	Fines	2%	−1/16 :	2

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
0 - 5	10	10	46	11	11	12
5 - 10	5	21	54	5	3	12
10 - 15	20	22	20	11	13	14
15 - 20	0	54	36	4	3	3
20 - 25	0	36	39	10	11	4
25 - 30	0	15	56	10	14	5
30 - 35	No grading available					
35 - 40	0	35	60	5	0	0
40 - 45	No grading available					
45 - 50	0	17	48	17	17	1
50 - 55	No grading available					
55 - 60	0	45	49	6	0	0
60 - 65	No grading available					
65 - 68	9	11	40	25	10	5

TM 24 SW 12 2041 4360 Rushmere St Andrew, Suffolk

Surface (+ 34.1 m) + 112 ft
Water struck at (+ 24.1 m) + 79 ft
Wirth B1, 6 to 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (14.2 m) 46.5 ft
Bedrock (0.1 m +) 0.5 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium yellow-brown sand with a trace of fine subrounded flint gravel.	(2.7)	9	(3,0)	10
		Medium to coarse sand, yellow brown, with fine to medium gravel; gravel percentage increasing with depth. Yellow sandy clay band (0.6 m) 2 ft thick at (5.8 m) 19 ft.	(4.3)	14	(7.3)	24
Red Crag	(b)	Pebbly Sand. Mainly fine to medium, but some coarse sand, red-brown.	(2.8)	9	(10.1)	33
		Coarse red sand with comminuted shells.	(4.4)	14.5	(14.5)	47.5
London Clay		Clay.	(0.1+)	0.5+	(14.6)	48

					%
(a)	Gravel	13%	+16 mm	:	5
			-16 +4	:	8
	Sand	84%	-4 +1	:	9
			-1 +¼	:	53
			-¼ +1/16	:	22
	Fines	3%	-1/16	:	3
(b)	Gravel	8%	+16 mm	:	2
			-16 +4	:	6
	Sand	90%	-4 +1	:	19
			-1 +¼	:	40
			-¼ +1/16	:	31
	Fines	2%	-1/16	:	2

Depth below surface (ft)	Percentages Fines -1/16	Sand +1/16 -¼	Sand +¼ -1	Sand +1 -4	Gravel +4 -16	Gravel +16
1 - 4	2	18	60	5	4	11
4 - 7	0	50	40	5	5	0
7 - 10	2	53	43	2	0	0
10 - 13	2	11	65	10	8	4
13 - 16	1	11	62	13	10	3
16 - 19	15	8	48	12	15	2
19 - 21	No samples taken					
21 - 24	2	6	52	13	11	16
24 - 27	1	42	43	12	2	0
27 - 30	1	46	32	15	6	0
30 - 33	2	30	48	15	5	0
33 - 36	3	35	36	23	3	0
36 - 39	3	22	41	20	11	3
39 - 42	3	27	37	21	10	2
42 - 45	2	24	37	23	7	7
45 - 47.5	3	22	45	23	4	3

TM 24 SW 13 2059 4212 Nacton, Suffolk

Surface (+ 35.7 m) + 117 ft
Water struck at (+ 22.4 m) + 74 ft
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (18.0 m) 59 ft
Bedrock just touched

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Mainly medium sand, red-brown at the top becoming yellow-brown with depth. A trace of gravel, fine to medium, composed of rounded quartzite and subangular flint. There is a (0.9 m) 3 ft band of coarser sand at (7.6 m) 25 ft.	(11.0)	36	(11.3)	37
Red Crag	(b)	Sand. Fine to medium sand, red-brown and yellow-brown, with occasional pebbles.	(3.6)	12	(14.9)	49
		Fine to medium red sand with shell fragments.	(3.4)	11	(18.3)	60
London Clay		Clay.		Just touched.		

					%
(a)	Gravel	7%	+16 mm	:	3
			−16 +4	:	4
	Sand	93%	−4 +1	:	17
			−1 +¼	:	59
			−¼ +1/16	:	17
	Fines	0%	−1/16	:	0
(b)	Gravel	2%	+16 mm	:	0
			−16 +4	:	2
	Sand	96%	−4 +1	:	16
			−1 +¼	:	54
			−¼ +1/16	:	26
	Fines	2%	−1/16	:	2

Depth below surface (ft)	Fines	Sand			Gravel	
	−1/16	+1/16−¼	+¼−1	+1−4	+4−16	+16
1 - 4	2	11	62	16	6	3
4 - 7	0	4	50	21	13	12
7 - 10	0	12	71	13	4	0
10 - 13	0	10	65	18	4	3
13 - 16	0	40	56	4	0	0
16 - 19	0	30	56	5	3	6
19 - 22	0	9	79	9	2	1
22 - 25	0	3	44	47	5	1
25 - 28	0	44	40	11	1	4
28 - 31	0	9	64	25	2	0
31 - 34	0	14	67	17	2	0
34 - 37	0	25	58	14	2	1
37 - 40	0	8	69	23	0	0
40 - 43	0	31	55	12	2	0
43 - 46	1	38	50	11	0	0
46 - 49	0	26	58	13	3	0
49 - 52	0	28	53	16	3	0
52 - 55	10	25	52	12	1	0
55 - 58	1	16	49	30	3	1
58 - 60	0	42	44	14	0	0

TM 24 SW 14 2062 4122 Ipswich, Suffolk

Surface (+ 32.6 m) + 107 ft
Water struck at (+ 20.7 m) + 68 ft
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (13.7 m) 45 ft
Bedrock (0.3 m +) 1 ft +

		Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium sand, brown and white with gravel. Gravel mainly brown angular to subrounded flints.	(8.2)	27	(8.5)	28
Red Crag	(b)	Pebbly Sand. Medium brown sand with fine to medium gravel. Gravel of subangular flint and rounded quartzite. Some shelly material at (9.4 m) 31 ft.	(2.8)	9	(11.3)	37
		Fine to medium sand with shell fragments.	(2.7)	9	(14.0)	46
London Clay		Clay.	(0.3+)	1+	(14.3)	47

					%
(a)	Gravel	7%	+16 mm	:	1
			−16 +4	:	6
	Sand	92%	−4 +1	:	8
			−1 +1/4	:	59
			−1/4 +1/16	:	25
	Fines	1%	−1/16	:	1
(b)	Gravel	12%	+16 mm	:	3
			−16 +4	:	9
	Sand	86%	−4 +1	:	17
			−1 +1/4	:	41
			−1/4 +1/16	:	28
	Fines	2%	−1/16	:	2

Depth below surface (ft)	Fines	Sand			Gravel	
	−1/16	+1/16 −1/4	+1/4 −1	+1 −4	+4 −16	+16
1 - 4	1	15	65	9	8	2
4 - 7	2	18	59	10	9	2
7 - 10	2	22	57	9	8	2
10 - 13	0	47	50	2	1	0
13 - 16	0	18	73	6	3	0
16 - 19	2	39	52	5	2	0
19 - 22	1	24	61	8	6	0
22 - 25	2	26	58	8	6	0
25 - 28	0	19	53	13	11	4
28 - 31	3	16	43	13	19	6
31 - 34	1	16	44	17	15	7
34 - 37	3	19	41	16	17	4
37 - 40	3	42	34	18	3	0
40 - 43	1	38	42	19	0	0
43 - 46	1	34	45	18	2	0

TM 24 SW 15 2038 4070 Nacton, Suffolk

Surface (+ 33.5 m) + 110 ft
Water struck at (+ 19.5 m) + 64 ft
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (16.5 m) 54 ft
Bedrock (0.3 m +) 1 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Medium, brown to yellow-brown sand with gravel. Gravel fine to medium, subrounded to angular flints and subrounded quartzite pebbles. Gravel percentage decreases towards the middle of the deposit, where at (2.1 m) 7 ft and (4.0 m) 13 ft there are (0.9 m) 3 ft and (1.8 m) 6 ft bands of fine yellow-brown clayey sand.	(9.1)	30	(9.4)	31
Red Crag	(b)	Pebbly Sand. Medium to coarse red-brown sand with fine to medium gravel. Gravel mainly composed of black flints.	(4.6)	15	(14.0)	46
		Fine to medium sand with shell fragments.	(2.8)	9	(16.8)	55
London Clay		Clay.	(0.3+)	1+	(17.1)	56

				%
(a)	Gravel	14%	+16 mm :	3
			−16 +4 :	11
	Sand	85%	−4 +1 :	15
			−1 +¼ :	54
			−¼ +1/16 :	16
	Fines	1%	−1/16 :	1
(b)	Gravel	13%	+16 mm :	2
			−16 +4 :	11
	Sand	85%	−4 +1 :	17
			−1 +¼ :	43
			−¼ +1/16 :	25
	Fines	2%	−1/16 :	2

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 4	1	7	52	26	9	5
4 - 7	1	10	60	17	10	2
7 - 10	0	22	64	12	2	0
10 - 13	0	5	57	26	12	0
13 - 16	0	22	60	17	1	0
16 - 19	0	37	59	4	0	0
19 - 22	1	17	40	13	22	7
22 - 25	1	28	46	9	14	2
25 - 28	1	12	56	11	13	7
28 - 31	0	7	42	21	22	8
31 - 34	0	6	53	20	17	4
34 - 37	3	11	38	25	19	4
37 - 40	0	9	40	22	24	5
40 - 43	1	16	35	25	16	7
43 - 46	3	43	41	8	5	0
46 - 49	4	35	47	13	1	0
49 - 52	2	43	42	12	1	0
52 - 55	2	38	45	10	5	0

TM 24 SW 16 2181 4289 Purdis Farm, Suffolk

Surface (+ 32.9 m) + 108 ft
Water struck at (+ 21.6 m) + 71 ft
Wirth B1, 8 - 6 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (14.2 m) 46.5 ft
Bedrock just touched

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Medium sand, red, brown and yellow-brown with fine to medium gravel. Gravel composed of subangular flint and subrounded quartz. Gravel percentage increasing with depth.	(4.6)	15	(4.9)	16
Red Crag	(b)	Pebbly Sand. Fine to medium brown sand with some gravel.	(4.2)	14	(9.1)	30
		Fine to medium red-brown sand with shell fragments.	(5.4)	17.5	(14.5)	47.5
London Clay		Clay.	Just touched.			

				%
(a)	Gravel	23%	+16 mm	13
			−16 +4	10
	Sand	71%	−4 +1	11
			−1 +¼	39
			−¼ +1/16	21
	Fines	6%	−1/16	6
(b)	Gravel	9%	+16 mm	3
			−16 +4	6
	Sand	88%	−4 +1	19
			−1 +¼	46
			−¼ +1/16	23
	Fines	3%	−1/16	3

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 4	15	18	46	7	8	6
4 - 7	7	35	45	9	4	0
7 - 10	3	30	24	16	14	13
10 - 13	2	18	39	17	15	9
13 - 16	1	6	39	8	10	36
16 - 19	3	29	32	16	8	12
19 - 22	0	41	36	16	5	2
22 - 25	0	52	30	7	7	4
25 - 28	2	21	52	17	6	2
28 - 31	5	23	31	34	6	1
31 - 34	4	27	40	19	4	1
34 - 37	3	21	56	6	4	10
37 - 40	3	12	40	26	16	3
40 - 43	2	11	57	26	4	0
43 - 46	2	12	66	20	0	0
46 - 47.5	3	9	65	23	0	0

TM 24 SW 17 2126 4234 Purdis Farm, Suffolk

Surface (+ 34.4 m) + 113 ft
Water struck at (+ 21.3 m) + 70 ft
Wirth B1, 8 - 6 inch diameter
November 1968

Overburden (0.3 m) 1 ft
Mineral (16.8 m) 55 ft
Bedrock (0.6 +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium, brown yellow-brown and red sand with fine to medium gravel. Gravels of angular to subangular brown and black flint and subrounded quartz.	(8.2)	27	(8.5)	28
Red Crag	(b)	Pebbly Sand. Medium to coarse brown to yellow-brown sand with medium gravel passing at (13.4 m) 44 ft into fine sand, black at the top (manganese stained) becoming brown at depth. Gravel composed of subangular to subrounded flint and quartz. Two bands of light brown clay, each (0.6 m) 2 ft thick, occur at (8.5 m) 28 ft and (10.1 m) 33 ft.	(7.7)	25	(16.2)	53
		Medium brown sand with comminuted shells.	(0.9)	3	(17.1)	56
London Clay		Clay.	(0.6+)	2+	(17.7)	58

					%
(a)	Gravel	8%	+16 mm	:	2
			-16 +4	:	6
	Sand	91%	-4 +1	:	11
			-1 +¼	:	59
			-¼ +1/16	:	21
	Fines	1%	-1/16	:	1
(b)	Gravel	14%	+16 mm	:	5
			-16 +4	:	9
	Sand	80%	-4 +1	:	16
			-1 +¼	:	45
			-¼ +1/16	:	19
	Fines	6%	-1/16	:	6

Depth below surface (ft)	Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
1 - 4	0	28	56	2	9	5
4 - 7	0	16	56	14	12	2
7 - 10	2	22	56	10	8	2
10 - 13	1	6	61	16	10	6
13 - 16	0	42	44	12	2	0
16 - 19	3	28	61	7	1	6
19 - 22	0	7	65	24	4	0
22 - 25	1	10	78	9	2	0
25 - 28	1	27	57	9	5	1
28 - 30	No samples taken					
30 - 33	0	8	42	16	12	22
33 - 35	No samples taken					
35 - 38	0	4	57	21	6	12
38 - 41	1	4	53	22	7	13
41 - 44	1	14	61	14	4	6
44 - 47	29	46	15	4	0	6
47 - 50	3	10	49	22	3	13
50 - 53	13	34	35	16	0	3
53 - 56	0	29	49	19	0	3

TM 24 SW 18 2182 4163 Foxhall, Suffolk

Surface (+ 30.5 m) + 100 ft
Water struck at (+ 20.1 m) + 66 ft
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (14.0 m) 46 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Medium red-brown sand with fine to medium gravel and clay bands. Gravel mainly subrounded black flints with occasional rounded quartz pebble. Gravel fraction increasing with depth.	(2.7)	9	(3.0)	10
Chillesford Beds	(b)	Pebbly Sand. Fine pale green sand with silt.	(1.0)	3	(4.0)	13
Red Crag	(c)	Pebbly Sand. Sand with gravel. Sand medium, yellow-brown at top becoming red-brown to dark red at depth. Gravel fine to medium, mainly subrounded flint and rounded quartz. Many flints manganese or iron coated. Gravel fraction decreasing with depth.	(8.2)	27	(12.2)	40
		Medium to coarse sand, red, with comminuted shells.	(2.1)	7	(14.3)	47
London Clay		Clay.	(0.6+)	2+	(14.9)	49

				%
(a)	Gravel	8%	+16 mm :	2
			−16 +4 :	6
	Sand	89%	−4 +1 :	4
			−1 +¼ :	66
			−¼ +1/16 :	19
	Fines	3%	−1/16 :	3
(b) & (c)	Gravel	11%	+16 mm :	4
			−16 +4 :	7
	Sand	88%	−4 +1 :	12
			−1 +¼ :	43
			−¼ +1/16 :	33
	Fines	1%	−1/16 :	1

Depth below surface (ft)	Fines	Sand			Gravel	
	−1/16	+1/16 −¼	+¼ −1	+1 −4	+4 −16	+16
1 - 4	2	21	71	3	3	0
4 - 7	0	13	77	5	5	0
7 - 10	8	22	51	3	9	7
10 - 13	4	70	19	1	6	0
13 - 16	1	11	59	17	12	0
16 - 18.5	0	7	51	17	16	9
18.5 - 22	0	8	65	8	6	13
22 - 25	0	22	51	11	7	9
25 - 28	2	23	45	12	7	11
28 - 31	0	55	38	31	2	2
31 - 34	2	63	31	1	1	2
34 - 37	0	37	49	9	4	1
37 - 40	2	46	44	5	3	0
40 - 43	2	36	31	24	6	1
43 - 47	2	24	29	33	10	2

TM 24 SW 19 2130 4065 Nacton, Suffolk

Surface (+ 35.1 m) + 115 ft
Water struck at (+ 24.7 m) + 81 ft
Wirth B1, 8 - 6 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (4.6 m) 15 ft
Waste (1.8 m) 6 ft
Mineral (10.1 m) 33 ft
Bedrock (0.3 m +) 1 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel (a)	Pebbly Sand. Medium to coarse red-brown and yellow sand with fine gravel. Gravel of rounded quartz and subangular flint; gravel fraction decreasing with depth.	(4.6)	15	(4.9)	16
Chillesford Beds	Brown clay with carbonaceous patches, some sand and gravel passing at (5.8 m) 19 ft into medium to coarse red-brown sand with green clay. Quartz and flint gravel present.	(1.8)	6	(6.7)	22
Red Crag (b)	Pebbly Sand. Medium to coarse sand, red-brown with fine to medium gravel. Gravel of subangular flint and rounded quartz. Deposit split by a (0.9 m) 3 ft band of brown clay with carbonaceous material and some medium sand at (7.6 m) 25 ft. Fine to medium sand at (9.4 m) 31 ft, red, with a little subangular flint gravel.	(5.5)	18	(12.2)	40
	Fine to medium red-brown sand with shell fragments and fine gravel. Sand becoming coarser and gravel fraction increasing with depth. Gravel of round black flints and quartz.	(4.6)	15	(16.8)	55
London Clay	Clay.	(0.3+)	1+	(17.1)	56

(a) Gravel 8% +16 mm : 2; −16 +4 : 6
Sand 91% −4 +1 : 16; −1 +¼ : 57; −¼ +1/16 : 18
Fines 1% −1/16 : 1

(b) Gravel 11% +16 mm : 1; −16 +4 : 10
Sand 88% −4 +1 : 21; −1 +¼ : 47; −¼ +1/16 : 20
Fines 1% −1/16 : 1

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 4	1	13	62	19	4	1
4 - 7	2	15	58	17	6	2
7 - 10	1	13	37	28	16	5
10 - 13	0	14	72	11	3	0
13 - 16	0	38	57	4	1	0
22 - 25	0	10	41	21	21	5
25 - 28	No grading available					
28 - 31	0	15	63	10	10	2
31 - 34	0	30	63	6	1	0
34 - 37	1	23	51	15	10	0
37 - 40	0	25	59	14	2	0
40 - 43	2	44	44	8	1	1
43 - 46	0	32	55	10	3	0
46 - 49	0	3	25	54	18	0
49 - 52	1	8	43	43	5	0
52 - 55	1	9	28	31	31	0

TM 24 SW 21 2262 4231 Foxhall, Suffolk

Surface (+ 27.4 m) + 90 ft
Water struck at (+ 19.5 m) + 64 ft
Wirth B1, 8 - 6 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (13.4 m) 44 ft
Bedrock just rouched

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sandy Gravel. Fine to medium yellow sand with gravel. Gravel concentrated in top (3.7 m) 12 ft and bottom (2.1 m) 7 ft. Gravel mainly subangular flint with rounded to subrounded quartz.	(6.7)	22	(7.0)	23
Red Crag	(b)	Pebbly Sand. Medium to coarse red sand with gravel.	(0.9)	3	(7.9)	26
		Medium to coarse red sand with gravel and comminuted shells. Gravel fine to medium, mainly rounded black flints.	(5.8)	19	(13.7)	45
London Clay		Clay.		Just touched.		

				%
(a)	Gravel	28%	+16 mm	18
			−16 +4	10
	Sand	70%	−4 +1	12
			−1 +¼	35
			−¼ +1/16	23
	Fines	2%	−1/16	2
(b)	Gravel	11%	+16 mm	4
			−16 +4	7
	Sand	88%	−4 +1	23
			−1 +¼	45
			−¼ +1/16	20
	Fines	1%	−1/16	1

Depth below surface (ft)	Fines	Percentages Sand			Gravel	
	−1/16	+1/16 −¼	+¼ −1	+1 −4	+4 −16	+16
1 - 4	11	16	34	5	12	22
4 - 7	0	3	26	16	17	38
7 - 10	1	11	58	15	11	4
10 - 13	0	70	25	3	2	0
13 - 16	0	30	51	19	0	0
16 - 19	1	22	27	8	10	32
19 - 23	2	7	28	21	15	27
23 - 26	0	16	38	31	7	8
26 - 29	2	15	42	33	8	0
29 - 32	1	17	38	31	8	5
32 - 35	3	22	48	17	8	2
35 - 38	2	16	50	21	5	6
38 - 41	2	21	54	14	6	3
41 - 45	0	31	47	11	8	3

TM 24 SW 22 2236 4132 Foxhall, Suffolk

Surface (+ 25.3 m) + 83 ft
Water struck at (+ 17.1 m) + 56 ft
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (10.1 m) 33 ft
Bedrock just touched

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium yellow sand with gravel. Gravel medium, mainly rounded quartz and subrounded flint.	(4.6)	15	(4.9)	16
Red Crag	(b)	Sand. Fine to medium red sand with brown clay-ironstone fragments and occasional rounded black pebbles.	(2.1)	7	(7.0)	23
		Sand, fine to medium with comminuted shells.	(3.4)	11	(10.4)	34
London Clay		Clay.	Just touched.			

					%	Depth below surface (ft)	Fines	Sand			Gravel	
							$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel	17%	+16 mm	:	11	1 - 3.5	1	28	53	6	7	5
			−16 +4	:	6	3.5 - 4.5	0	10	37	14	14	23
						4.5 - 7.5	0	40	36	7	5	12
	Sand	82%	−4 +1	:	6	7.5 - 10.5	0	55	28	6	5	6
			−1 $+\frac{1}{4}$	:	37	10.5 - 13.5	2	53	42	3	0	0
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	39	13.5 - 16	2	28	20	7	11	32
	Fines	1%	$-\frac{1}{16}$	:	1							
(b)	Gravel	4%	+16 mm	:	0	16 - 19	1	39	51	4	5	0
			−16 +4	:	4	19 - 22	1	62	27	5	5	0
						22 - 25	4	41	42	10	10	2
	Sand	94%	−4 +1	:	9	25 - 28	3	37	44	8	8	0
			−1 $+\frac{1}{4}$	:	41	28 - 31	2	39	42	14	3	0
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	44	31 - 34	3	42	39	12	4	0
	Fines	2%	$-\frac{1}{16}$	:	2							

TM 24 SW 23 2261 4068 Nacton, Suffolk

Surface (+ 25.6 m) + 84 ft
Water not struck
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (12.8 m) 42 ft
Bedrock (1.2 m +) 4 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sandy Gravel. Medium to coarse sand, brown to red-brown, with gravel. Gravel medium, subangular flints and rounded quartz. A (0.9 m) 3 ft band of fine sand, whitish-brown, with lumps of grey clay occurs at (3.0 m) 10 ft.	(5.5)	18	(5.8)	19
Red Crag	(b)	Sand. Medium to coarse sand, brown and yellow, with a trace of gravel.	(4.6)	15	(10.4)	34
		Medium to coarse brown sand with comminuted shells.	(2.7)	9	(13.1)	43
London Clay		Clay.	(1.2+)	4+	(14.3)	47

					%
(a)	Gravel	37%	+16 mm	:	13
			−16 +4	:	24
	Sand	63%	−4 +1	:	22
			−1 +¼	:	35
			−¼ +1/16	:	6
	Fines	0%	−1/16	:	0
	Gravel	3%	+16 mm	:	0
			−16 +4	:	3
	Sand	96%	−4 +1	:	28
			−1 +¼	:	49
			−¼ +1/16	:	19
	Fines	1%	−1/16	:	1

Depth below surface (ft)	Fines	Sand			Gravel	
	−1/16	+1/16−¼	+¼−1	+1−4	+4−16	+16
1 - 4	1	6	39	20	25	9
4 - 7	0	4	38	24	19	15
7 - 10	1	6	36	21	23	13
10 - 13	No grading available					
13 - 16	0	10	26	14	25	25
16 - 19	0	3	34	32	26	5
19 - 22	0	16	54	24	4	2
22 - 25	0	30	43	24	3	0
25 - 28	0	32	38	28	2	0
28 - 31	2	16	54	25	3	0
31 - 34	2	14	64	20	0	0
34 - 37	2	20	43	33	2	0
37 - 40	1	15	49	33	2	0
40 - 43	1	13	47	33	5	1

TW 24 SW 24 2426 4310 Bucklesham, Suffolk

Surface (+ 23.8 m) + 78 ft
Water struck at (+ 12.8 m) + 42 ft
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (11.3 m) 37 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sandy Gravel. Medium yellow-brown and red sand, becoming fine at depth with fine to medium gravel. Gravel fraction decreasing with depth, and mainly composed of sub-rounded to subangular brown flints.	(4.0)	13	(4.3)	14
Red Crag	(b)	Pebbly Sand. Medium red and yellow sand, with a (0.9 m) 3 ft band of fine carbonaceous sand at (7.0 m) 23 ft. Some gravel.	(4.5)	15	(8.8)	29
		Medium to coarse sand with comminuted shells and rounded black pebbles at the base.	(2.8)	9	(11.6)	38
London Clay		Clay.	(0.6+)	2+	(12.2)	40

					%	Depth below surface (ft)	Fines $-\frac{1}{16}$	Sand $+\frac{1}{16}-\frac{1}{4}$	Sand $+\frac{1}{4}-1$	Sand $+1-4$	Gravel $+4-16$	Gravel $+16$
(a)	Gravel	35%	+16 mm	:	14	1 - 4	3	3	37	17	36	4
			−16 +4	:	21	4 - 8	0	3	37	10	22	28
						8 - 11	1	39	27	4	7	22
	Sand	62%	−4 +1	:	11	11 - 14	7	40	19	14	17	3
			−1 $+\frac{1}{4}$	:	30							
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	21							
	Fines	3%	$-\frac{1}{16}$	:	3							
(b)	Gravel	7%	+16 mm	:	1%	14 - 17	3	28	56	9	22	2
			−16 +4	:	6	17 - 20	4	31	45	12	8	0
						20 - 23	4	34	44	14	1	3
	Sand	90%	−4 +1	:	20	23 - 26	3	84	8	2	3	0
			−1 $+\frac{1}{4}$	:	40	26 - 29	4	26	50	9	5	6
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	30	29 - 32	2	6	41	51	0	0
						32 - 35	2	12	42	32	12	0
	Fines	3%	$-\frac{1}{16}$	:	3	35 - 38	2	16	33	35	14	0

TM 24 SW 25 2360 4241 Bucklesham, Suffolk

Surface (+ 24.4 m) + 80 ft
Water struck at (+ 18.3 m) + 60 ft
Wirth B1, 8 inch diameter
October 1968

Overburden (0.6 m) 2 ft
Mineral (7.0 m) 23 ft
Bedrock (0.3 m +) 1 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Sandy Gravel. Medium to coarse sand with fine to medium gravel. Gravel of subangular flint with (rarely) subrounded quartz.	(1.5)	5	(2.1)	7
Red Crag	(b)	Pebbly Sand. Fine to medium red and yellow sand with some gravel.	(3.4)	11	(5.5)	18
		Fine to medium red sand with comminuted shells and rounded black pebbles at the base.	(2.1)	7	(7.6)	25
London Clay		Clay.	(0.3+)	1+	(7.9)	26

				%	Depth below surface (ft)	Fines	Sand			Gravel	
						−1/16	+1/16 −1/4	+1/4 −1	+1 −4	+4 −16	+16
(a)	Gravel	25%	+16 mm :	9	2 - 5	0	16	28	11	28	17
			−16 +4 :	16	5 - 8	3	22	55	14	4	2
	Sand	73%	−4 +1 :	13							
			−1 +1/4 :	41							
			−1/4 +1/16 :	19							
	Fines	2%	−1/16 :	2							
(b)	Gravel	6%	+16 mm :	1	8 - 11	0	25	57	12	5	1
			−16 +4 :	5	11 - 14	0	37	51	12	0	0
					14 - 17	0	20	72	5	3	0
	Sand	94%	−4 +1 :	12	17 - 20	0	66	23	8	3	0
			−1 +1/4 :	49	20 - 23	0	25	47	22	6	0
			−1/4 +1/16 :	33	23 - 26	0	24	46	13	11	6
	Fines	0%	−1/16 :	0							

TM 24 SW 26 2352 4160 Bucklwsham, Suffolk

Surface (+ 28.7 m) +94 ft
Water struck at (+ 19.5 m) + 64 ft
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (12.8 m) 42 ft
Bedrock just touched

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Medium to coarse sand, yellow-brown, to red-brown, with fine gravel. Gravel composed of brown and black flint, subangular, and quartz, subrounded. Gravel percentage increases with depth.	(4.6)	15	(4.9)	16
Red Crag	(b)	Sand. Sand, fine to medium, reddish to brown.	(5.5)	18	(10.4)	34
		Medium to coarse brown sand with comminuted shells.	(2.7)	9	(13.1)	43
London Clay		Clay.			Just touched.	

				%	Depth below surface (ft)	Fines $-\frac{1}{16}$	Sand $+\frac{1}{16}-\frac{1}{4}$	Sand $+\frac{1}{4}-1$	Sand $+1-4$	Gravel $+4-16$	Gravel $+16$
(a)	Gravel	10%	+16 mm :	1	1 - 4	1	5	46	36	12	0
			−16 +4 :	9	4 - 7	1	8	74	16	1	0
					7 - 10	0	9	79	12	0	0
	Sand	89%	−4 +1 :	24	10 - 13	0	4	53	28	13	2
			−1 $+\frac{1}{4}$:	60	13 - 16	1	3	48	26	19	3
			$-\frac{1}{4}$ $+\frac{1}{16}$:	5							
	Fines	1%	$-\frac{1}{16}$:	1							
(b)	Gravel	1%	+16 mm :	0	16 - 19	2	24	62	12	0	0
			−16 +4 :	1	19 - 22	1	37	46	12	4	0
					22 - 25	3	36	48	11	2	0
	Sand	97%	−4 +1 :	16	25 - 28	0	33	55	11	1	0
			−1 $+\frac{1}{4}$:	53	28 - 31	1	44	47	8	0	0
			$-\frac{1}{4}$ $+\frac{1}{16}$:	28	31 - 34	1	27	53	19	0	0
					34 - 37	2	22	54	20	2	0
	Fines	2%	$-\frac{1}{16}$:	2	37 - 40	1	21	56	22	0	0
					40 - 43	3	14	53	28	2	0

TM 24 SW 27 2367 4074 Levington, Suffolk

Surface (+ 24.4 m) + 80 ft
Water struck at (+ 17.7 m) 58 ft
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (12.8 m) 42 ft
Bedrock (0.3 m +) 1 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sand. Fine to medium sand becoming coarser with depth, whitish-brown to yellow-brown. A trace of fine gravel.	(6.4)	21	(6.7)	22
Red Crag	(b)	Sand. Fine to medium red-brown sand with purple manganese staining. A trace of fine gravel.	(1.8)	6	(8.5)	28
		Medium sand, brown with comminuted shells.	(4.6)	15	(13.1)	43
London Clay		Clay.	(0.3+)	1+	(13.4)	44

				%
(a)	Gravel	1%	+16 mm :	0
			−16 +4 :	1
	Sand	98%	−4 +1 :	12
			−1 +¼ :	63
			−¼ +1/16 :	23
	Fines	1%	−1/16 :	1
(b)	Gravel	3%	+16 mm :	0
			−16 +4 :	3
	Sand	95%	−4 +1 :	18
			−1 +¼ :	52
			−¼ +1/16 :	25
	Fines	2%	−1/16 :	2

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
1 - 4	2	6	80	12	0	0
4 - 7	1	13	71	11	4	0
7 - 10	0	40	54	2	4	0
10 - 13	2	35	61	2	0	0
13 - 16	0	33	47	20	0	0
16 - 19	2	11	67	20	0	0
19 - 22	0	24	59	15	2	0
22 - 25	1	14	72	13	0	0
25 - 28	0	29	56	13	2	0
28 - 31	1	27	58	12	2	0
31 - 34	3	30	47	17	3	0
34 - 37	3	30	47	16	4	0
37 - 40	1	32	43	22	2	0
40 - 43	2	19	38	34	7	0

TM 24 SW 28 2442 4243 Foxhall, Suffolk

Surface (+ 17.1 m) + 56 ft
Water struck at (13.4 m) 44 ft
Wirth B1, 8 inch diameter
September 1968

Overburden (2.4 m) 8 ft
Mineral (2.1 m) 7 ft
Bedrock (0.6 m +) 2 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(1.2)	4	(1.2)	4
? Chillesford Beds	Red brown sandy clay with layers of grey-green silty clay; some flint pebbles at base.	(1.2)	4	(2.4)	8
Red Crag	Pebbly Sand. Coarse red brown sand with hard ironstone bands at the base.	(1.3)	4	(3.7)	12
	Sand with comminuted shells.	(0.9)	3	(4.6)	15
London Clay	Clay.	(0.6+)	2+	(5.2)	17

				%
Gravel	6%	+16 mm	:	2
		-16 +4	:	4
Sand	91%	-4 +1	:	15
		-1 +¼	:	51
		-¼ +1/16	:	25
Fines	3%	-1/16	:	3

Depth below surface (ft)	Percentages Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
8 - 11	3	32	50	12	3	0
11 - 14	3	20	49	20	5	3
14 - 15	2	19	61	10	5	3

TM 24 SW 29 2454 4150 Bucklesham, Suffolk

Surface (+ 25.9 m) + 85 ft
Water struck at (+ 17.4 m) + 57 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.3 m) 1 ft
Mineral (13.7 m) 45 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Brown silty sand with occasional rounded to subangular flints.	(0.9)	3	(1.2)	4
Chillesford Beds	(b)	Green clayey silt with fine sand and occasional pebbles passing, at (3.0 m) 10 ft into sand with fine to medium gravel and some green silt and shaly clay. Interbedded fine red-yellow sand and green silt and clay at (5.8 m) 19 ft.	(6.4)	21	(7.6)	25
Red Crag	(c)	Sand.				
		Fine to medium red sand.	(4.3)	14	(11.9)	39
		Medium sand with comminuted shells. Numerous black phosphatic pebbles at base.	(2.1)	7	(14.0)	46
London Clay		Clay.	(0.6+)	2+	(14.6)	48

					%
(a) & (b)*					
(c)	Gravel	2%	+16 mm	:	0
			−16 +4	:	2
	Sand	96%	−4 +1	:	11%
			−1 +¼	:	50
			−¼ +1/16	:	35
	Fines	2%	−1/16	:	2

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 25	No grading available*					
25 - 28	3	37	48	11	1	0
28 - 31	2	36	49	7	6	0
31 - 34	1	41	47	11	0	0
34 - 37	2	28	58	11	1	0
37 - 40	3	39	43	13	2	0
40 - 43	4	26	54	14	2	0
43 - 46	No grading available					

*Grading display omitted from map

TM 24 SW 30 2438 4035 Levington, Suffolk

Surface (+ 28.0 m) + 92 ft
Water struck at (+ 16.8 m) + 55 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.3 m) 1 ft
Mineral (13.7 m) 45 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Medium to coarse, yellow-brown to brown sand with gravel. Gravel fine to medium mainly subangular to subrounded flints, with rounded quartz pebbles. Gravel fraction increasing with depth. Thin clay partings throughout.	(8.2)	27	(8.5)	28
Red Crag	(b)	Pebbly Sand. Medium to coarse brown sand with some gravel.	(2.8)	9	(11.3)	37
		Medium to coarse red-brown sand with comminuted shells.	(2.7)	9	(14.0)	46
London Clay		Clay.	(0.6+)	2+	(14.6)	48

					%
(a)	Gravel	14%	+16 mm	:	3
			−16 +4	:	11
	Sand	85%	−4 +1	:	22
			−1 +¼	:	54
			−¼ +1/16	:	9
	Fines	1%	−1/16	:	1
(b)	Gravel	7%	+16 mm	:	2
			−16 +4	:	5
	Sand	92%	−4 +1	:	26
			−1 +¼	:	57
			−¼ +1/16	:	9
	Fines	1%	−1/16	:	1

Depth below surface (ft)	Fines	Percentages Sand			Gravel	
	−1/16	+1/16−¼	+¼−1	+1−4	+4−16	+16
1 - 4	3	17	48	27	5	0
4 - 7	0	16	62	17	5	0
7 - 10	0	10	77	7	6	0
10 - 13	0	5	56	26	11	2
13 - 16	0	8	65	18	8	1
16 - 19	2	5	40	26	22	5
19 - 22	0	4	49	27	17	3
22 - 25	0	3	43	22	21	11
25 - 28	1	17	49	23	8	2
28 - 31	2	14	50	23	8	3
31 - 34	0	15	51	24	8	2
34 - 37	0	24	53	19	2	2
37 - 40	3	18	48	28	3	0
40 - 43	0	8	52	34	6	0
43 - 46	1	8	54	29	6	2

TM 24 SE 6 2807 4412 Martlesham, Suffolk

Surface level (+ 18.0 m) + 59 ft
Water struck at (+ 8.8 m) + 29 ft
Shell and auger, 6 inch diameter
September 1966

Overburden (0.5 m) 1.5 ft
Mineral (10.9 m) 36.0 ft
Bedrock (0.8 m +) 2.5 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, with gravel.	(1.0)	3.5	(1.5)	5
Red Crag	(b)	Sand. Sand, brown.	(4.3)	14	(5.8)	19
		Sand, brown, shelly with a little gravel.	(5.6)	18.5	(11.4)	37.5
London Clay		Blue-grey clay.	(0.8+)	2.5	(12.2)	40

(a) One sample only

(b) Gravel 2% +16 mm : 0
-16 +4 : 2
Sand 94% -4 +1 : 18
-1 +¼ : 59
-¼ +1/16 : 17
Fines 4% -1/16 : 4

Depth below surface (ft)	Percentages Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
1 - 5	2	8	57	21	10	2
5 - 10	2	21	55	21	1	0
10 - 15	5	12	71	12	0	0
15 - 20	10	16	59	14	1	0
20 - 25	No grading available					
25 - 30	3	23	54	18	2	0
30 - 35	No grading available					
35 - 37.5	1	11	53	27	6	2

TM 24 SE 7 2700 4400 Waldringfield, Suffolk

Surface level (+ 25.0 m) + 82 ft
Water struck at (+ 8.5 m) + 28 ft
Shell and auger, 6 inch diameter
September 1966

Overburden (0.5 m) 1.5 ft
Mineral (20.1 m +) 66 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, mainly fine to medium, silty in upper (1.1 m) 3.5 ft, gravel mainly in lower part.	(3.5)	11.5	(4.0)	13
Red Crag	(b)	Sand. Sand, brown.	(9.1)	30	(13.1)	43
		Sand, shelly, with coprolites at base.	(7.5+)	24.5+	(20.6)	67.5

				%
(a)	Gravel	8%	+16 mm :	1
			−16 +4 :	7
	Sand	85%	−4 +1 :	13
			−1 +¼ :	56
			−¼ +1/16 :	16
	Fines	7%	−1/16 :	7
(b)	Gravel	2%	+16 mm :	0
			−16 +4 :	2
	Sand	94%	−4 +1 :	15
			−1 +¼ :	57
			−¼ +1/16 :	22
	Fines	4%	−1/16 :	4

Depth below surface (ft)	Fines	Sand			Gravel	
	−1/16	+1/16 −¼	+¼ −1	+1 −4	+4 −16	+16
1 - 5	13	29	49	7	2	0
5 - 10	2	15	55	20	7	1
10 - 15	7	14	54	13	9	3
15 - 20	7	38	46	7	1	0
25 - 30	No grading available					
30 - 35	5	20	66	9	0	0
35 - 40	No grading available					
40 - 45	9	14	62	13	0	0
45 - 55	No grading available					
55 - 60	1	10	44	21	8	1
60 - 67.5	0	24	47	24	2	0

Means (b) based on 5 samples only

TM 24 SE 8 2598 4402 Martlesham, Suffolk

Surface level (+ 13.1 m) + 43 ft
Water struck at (+ 11.0 m) + 36 ft
Shell and auger, 6 inch diameter
October 1966

Overburden (+ 0.6 m) + 2 ft
Mineral (12.2 m) 40 ft
Bedrock (0.9 m +) 3 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Red Crag	Pebbly Sand. Sand, shelly.	(12.2)	40	(12.8)	42
London Clay	Blue-grey clay.	(0.9+)	3+	(13.7)	45

				%
Gravel	5%	+16 mm	:	0
		-16 +4	:	5
Sand	93%	-4 +1	:	29
		-1 +¼	:	41
		-¼ +1/16	:	23
Fines	2%	-1/16	:	2

Depth below surface (ft)	Fines	Sand			Gravel	
	-1/16	+1/16-¼	+¼-1	+1-4	+4-16	+16
1 - 5	No grading available					
5 - 10	5	27	48	18	2	0
10 - 15	No gradaing available					
15 - 20	2	18	44	26	8	2
20 - 25	No grading available					
25 - 30	1	25	32	38	4	0
30 - 35	No grading available					
35 - 40	1	21	39	34	5	0
40 - 42	No grading available					

Above means based on 4 samples only

TM 24 SE 9 2513 4500 Martlesham, Suffolk

Surface level (+ 24.4 m) + 80 ft
Water struck at (+ 13.1 m) + 43
Shell and auger, 6 inch diameter
August 1966

Overburden (0.3 m) 1 ft
Mineral (15.5 m) 51 ft
Bedrock (0.9 m +) 3 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand.				
		Sand, yellow and brown, with gravel. Finer at base.	(4.3)	14	(4.6)	15
Red Crag	(b)	Sand.				
		Sand, mainly fine to medium, brown.	(6.1)	20	(10.7)	35
		Sand, shelly.	(5.1)	17	(15.8)	52
London Clay		Blue-grey clay	(0.9+)	3+	(16.7)	55

				%
(a)	Gravel	15%	+16 mm	5
			−16 +4	10
	Sand	84%	−4 +1	14
			−1 +¼	44
			−¼ +1/16	26
	Fines	1%	−1/16	1
(b)	Gravel	1%	+16 mm	0
			−16 +4	1
	Sand	95%	−4 +1	17
			−1 +¼	45
			−¼ +1/16	33
	Fines	4%	−1/16	4

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
1 - 5	2	17	51	11	9	10
5 - 10	1	10	42	24	17	6
10 - 15	0	50	38	8	4	0
15 - 20	7	40	50	3	0	0
20 - 25	No gradings available					
25 - 30	5	42	36	15	2	0
30 - 35	No gradings available					
35 - 40	3	35	41	20	1	0
40 - 45	2	37	43	16	2	0
45 - 50	No gradings available					
50 - 52	2	12	49	31	2	0

Means (b) calculated on 5 samples

TM 24 SE 10 2500 4412 Martlesham, Suffolk

Surface level (+ 26.8 m) + 88 ft
Water struck at (+ 11.0 m) + 36 ft
Shell and auger, 6 inch diameter
August 1966

Overburden (0.3 m) 1 ft
Mineral (18.9 m) 62 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sandy Gravel. Sand, yellow and brown, with gravel.	(6.1)	20	(6.4)	21
Red Crag	(b)	Sand. Sand, dark brown.	(5.8)	19	(12.2)	40
		Sand, shelly	(7.0)	23	(19.2)	63
London Clay		Blue-grey clay.	(0.6+)	2+	(19.8)	65

					%
(a)	Gravel	25%	+16 mm	:	12
			−16 +4	:	13
	Sand	67%	−4 +1	:	14
			−1 +¼	:	38
			−¼ +1/16	:	15
	Fines	8%	−1/16	:	8
(b)	Gravel	3%	+16 mm	:	0
			−16 +4	:	3
	Sand	89%	−4 +1	:	18
			−1 +¼	:	51
			−¼ +1/16	:	20
	Fines	8%	−1/16	:	8

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 5	22	22	32	4	10	10
5 - 10	2	13	50	13	10	12
10 - 15	5	17	48	12	17	1
15 - 20	1	9	26	23	16	25
*20 - 25	6	39	32	9	9	5
25 - 30	6	32	54	8	0	0
30 - 35	No gradings available					
35 - 40	7	23	55	15	0	0
40 - 45	15	18	46	21	0	0
45 - 50	No gradings available					
50 - 55	1	5	53	28	11	2
55 - 63	No gradings available					

*This sample includes 1 ft of a) Glacial Sand and Gravel, hence high gravel values, and was not used in calculation of mean brading of (b).

TM 24 SE 11 2513 4307 Brightwell, Suffolk

Surface level (+ 13.7 m) + 45 ft
Groundwater conditions not recorded.
Wirth B1, 8 inch diameter
October 1968

Overburden (0.3 m) 1 ft
Mineral (8.8 m) 29 ft
Bedrock just touched

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Red Crag	Sand.				
	Sand, medium-coarse, red, for (0.6 m) 2 ft, then medium-coarse reddish-yellow shelly sand with occasional flint pebbles.	(8.8)	29	(9.1)	30
London Clay	Blue-grey clay.	Just touched.			

				%
Gravel	3%	+16 mm	:	0
		−16 +4	:	3
Sand	96%	−4 +1	:	29
		−1 +¼	:	55
		−¼ +1/16	:	12
Fines	1%	−1/16	:	1

Depth below surface (ft)	Fines	Percentages Sand			Gravel	
	−1/16	+1/16−¼	+¼−1	+1−4	+4−16	+16
1 - 3	1	24	55	17	3	0
3 - 6	2	21	47	30	0	0
6 - 9	0	15	57	24	4	0
9 - 12	0	9	37	54	0	0
12 - 15	1	10	58	27	4	0
15 - 18	0	7	56	37	0	0
18 - 21	0	4	70	21	5	0
21 - 24	1	3	64	30	2	0
24 - 27	0	8	57	28	7	0
27 - 30	1	22	54	21	2	0

TM 24 SE 12 2589 4190 Purdis Farm, Suffolk

Surface level (+ 21.6 m) + 71 ft
Water struck at (+ 9.1 m) + 30 ft
Wirth B1, 6 inch diameter
June 1969

Overburden (0.6 m) 2 ft
Mineral (15.1 m) 49.5 ft
Bedrock (0.2 m +) 0.5 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, medium-coarse in top (1.5 m) 5 ft, becoming mainly fine below; yellow to brown. Gravel mainly in top (2.7 m) 9 ft; flints predominant, angular to sub-rounded, with a little white quartz, rounded.	(4.1)	13.5	(4.7)	15.5
Red Crag	(b)	Sand. Sand, mainly fine-medium red-brown to dark chocolate brown.	(7.9)	26	(12.6)	41.5
		Sand, medium, red-brown, shelly. Rounded black phosphatic pebbles and coprolites at base.	(3.1)	10	(15.7)	51.5
London Clay		Blue-grey clay.	(0.2+)	0.5+	(15.9)	52

				%
(a)	Gravel	11%	+16 mm :	4
			−16 +4 :	7
	Sand	82%	−4 +1 :	10
			−1 +¼ :	23
			−¼ +1/16 :	49
	Fines	7%	−1/16 :	7
(b)	Gravel	2%	+16 mm :	1
			−16 +4 :	1
	Sand	90%	−4 +1 :	5
			−1 +¼ :	66
			−¼ +1/16 :	19
	Fines	8%	−1/16 :	8

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
2 - 5	6	6	41	14	20	13
5 - 6.5	5	31	33	19	8	4
6.5 - 9.5	1	81	7	5	4	2
9.5 - 12.5	13	79	6	1	1	0
12.5 - 15.5	9	54	26	9	1	1
15.5 - 18.5	8	40	43	7	1	1
18.5 - 21.5	7	28	59	4	2	0
21.5 - 24.5	8	30	56	4	1	1
24.5 - 27.5	10	26	56	6	1	1
27.5 - 30.5	14	23	57	4	1	1
30.5 - 33.5	10	19	68	2	0	1
33.5 - 36.5	10	18	68	3	1	0
36.5 - 39.5	10	16	71	2	0	1
39.5 - 42.5	9	18	70	1	1	1
42-5 - 45.5	6	13	75	4	2	0
45.5 - 48.5	6	13	71	8	1	1
48.5 - 51.5	5	13	58	17	4	3

TM 24 SE 13 2520 4175 Bucklesham, Suffolk

Surface level (+ 26.2 m) + 86 ft
Water struck at (+ 12.2 m) + 40 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.3 m) 1 ft
Mineral (17.7 m) 58 ft
Bedrock (0.2 m +) 0.5 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sandy Gravel. Sand, yellow, coarse to (3.0 m) 10 ft, then fine-medium. Gravel, c.40% in upper (1.8 m) 6 ft, consisting mainly of flints, rounded up to (25 mm) 1 in, subangular up to (50 mm) 2 ins. Below (1.8 m) 6 ft; gravel c.50% of which 80% is fine gravel, all rounded quartz and quartzite with occasional subangular flints. Brown stoneless clay at (2.1 m) 7 ft.	(3.7)	12	(4.0)	13
Chillesford Beds	(b)	Pebbly Sand. Gravel in upper (3.7 m) 12 ft, and green clay clay bands from (4.0 m) 13 ft to (5.2 m) 17 ft. Sand, medium, yellow to (5.2 m) 17 ft, coarse red to (6.1 m) 20 ft, then green brown and red, with silt, to (8.5 m) 28 ft. Gravel, subangular flints, rounded quartz.	(4.5)	15	(8.5)	28
Red Crag	(c)	Sand. Sand, fine-medium, red, yellow and occasionally black.	(5.5)	18	(14.0)	46
		Sand, red, shelly.	(4.0)	13	(18.0)	59
London Clay		Blue-grey clay.	(0.2+)	0.5+	(18.2)	59.5

(a) Gradings not available for Glacial Sand and Gravel; grading display diagram omitted from map

(b)

			%
Gravel	6%	+16 mm :	1
		−16 +4 :	5
Sand	92%	−4 +1 :	18
		−1 +¼ :	66
		−¼ +1/16 :	8
Fines	2%	−1/16 :	2
Gravel	1%	+16 mm :	0
		−16 +4 :	1
Sand	95%	−4 +1 :	21
		−1 +¼ :	53
		−¼ +1/16 :	21
Fines	4%	−1/16 :	4

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
17 - 19	2	6	72	10	8	2
19 - 22	5	5	58	27	4	1
22 - 25	7	7	61	19	9	2
25 - 28	2	11	71	16	0	0
28 - 31	0	19	54	27	0	0
31 - 34	0	15	76	9	0	0
34 - 37	4	33	47	16	0	0
37 - 40	22	22	43	12	1	0
40 - 43	2	33	47	17	1	0
43 - 46	2	14	58	24	2	0
46 - 49	1	22	52	24	1	0
49 - 52	2	19	49	27	2	1
52 - 55	2	9	52	32	5	0
55 - 59	No grading available					

TM 24 SE 14 2556 4079 Bucklesham, Suffolk

Surface level (+ 24.7 m) + 81 ft
Water struck at (+ 17.4 m) + 57 ft
Wirth B1, 6 inch diameter
November 1968

Overburden (0.3 m) 1 ft
Mineral (13.7 m) 45 ft
Bedrock (0.6 m +) 2 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel (a)	Sandy Gravel. Sand, medium to coarse, yellow to brown with occasional bands of stoneless clay. Gravel, predominantly subangular flints, maximum diameter *c* (64 mm) 2.5 ins in upper (3.0 m) 10 ft; below approximately equal amounts of subrounded quartzite, maximum diameter *c* (59 mm) 2 ins and irregular flints, maximum diameter (75 mm) 3 ins.	(4.6)	15	(4.9)	16
Red Crag (b)	Pebbly Sand. Sand, fine-medium, red with thin layers of brownish clay. Gravel, mainly rounded black flints.	(6.4)	21	(11.3)	37
	Sand, medium, red, shelly. Black rounded phosphatic pebbles and coprolites at base.	(2.7)	9	(14.0)	46
London Clay	Blue-grey clay.	(0.6+)	2+	(14.6)	48

				%
(a)	Gravel	29%	+16 mm :	11
			−16 +4 :	18
	Sand	70%	−4 +1 :	20
			−1 +¼ :	45
			−¼ +1/16 :	5
	Fines	1%	−1/16 :	1
(b)	Gravel	6%	+16 mm :	2
			−16 +4 :	4
	Sand	92%	−4 +1 :	16
			−1 +¼ :	54
			−¼ +1/16 :	22
	Fines	2%	−1/16 :	2

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 4	1	3	36	24	19	17
4 - 7	2	8	38	27	23	2
7 - 10	2	6	26	19	30	17
10 - 13	0	6	57	11	12	14
13 - 16	0	3	59	26	9	3
16 - 19	2	29	49	12	5	3
19 - 22	2	27	46	14	8	3
22 - 25	0	30	49	14	3	2
25 - 28	1	21	63	15	0	0
28 - 31	1	23	54	18	2	2
31 - 34	2	26	54	15	1	2
34 - 37	2	13	68	14	3	0
37 - 40	2	26	54	16	2	0
40 - 43	1	19	60	18	2	0
43 - 46	4	14	33	27	16	6

Percentages

TM 24 SE 15 2626 4325 Newbourn, Suffolk

Surface (+ 24.4 m) + 80 ft
Water struck at (+ 6.7 m) + 22 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.3 m) 1 ft
Mineral (21.0 m) 69 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium white, brown and yellow sand with medium to coarse gravel, mainly subangular black flint. Rather clayey at top.	(1.8)	6	(2.1)	7
Red Crag	(b)	Sand. Fine to medium white and brown sand with a trace of fine gravel. Clayey in top (1.5 m) 5 ft.	(8.8)	29	(11.0)	36
		Fine to medium red-brown sand with comminuted shells.	(10.4)	34	(21.4)	70
London Clay		Blue-grey clay.	(0.6+)	2+	(22.0)	72

				%
(a)	Gravel	12%	+16 mm :	6
			−16 +4 :	6
	Sand	86%	−4 +1 :	17
			−1 +¼ :	56
			−¼ +1/16 :	13
	Fines	2%	−1/16 :	2
(b)	Gravel	2%	+16 mm :	0
			−16 +4 :	2
	Sand	96%	−4 +1 :	20
			−1 +¼ :	56
			−¼ +1/16 :	20
	Fines	2%	−1/16 :	2

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 4	3	14	56	22	3	2
4 - 7	0	12	57	16	8	11
7 - 10	3	18	62	15	2	0
10 - 13	No grading available					
13 - 16	3	21	63	13	0	0
16 - 19	1	19	59	20	1	0
19 - 22	1	17	64	17	1	0
22 - 25	3	23	43	30	1	0
25 - 28	0	4	52	41	3	0
28 - 31	2	14	65	19	0	0
31 - 34	0	38	56	4	1	1
34 - 37	0	11	74	14	1	0
37 - 40	1	26	56	16	1	0
40 - 43	0	30	50	18	2	0
43 - 45	2	18	60	18	2	0
45 - 48	0	13	49	36	2	0
48 - 51	3	9	59	29	1	0
51 - 54	2	10	55	31	2	0
54 - 57	3	35	44	17	1	0
57 - 60	2	33	47	15	3	0
60 - 63	1	36	43	17	3	0
63 - 69	No grading available					
69 - 70	0	18	58	12	7	5

TM 24 SE 16 2683 4269 Newbourn, Suffolk

Surface level (+ 22.3 m) + 73 ft
Groundwater conditions not recorded
Wirth B1, 6 inch diameter
November 1968

Overburden (0.6 m) 2 ft
Mineral (11.9 m) 39 ft
Bedrock (0.9 m +) 3 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil	(0.6)	2	(0.6)	2
? Glacial Sand and Gravel (a)	Sand. Sand, fine-medium, yellow to pale brown, with a little clay. Occasional flint pebbles.	(2.8)	9	(3.4)	11
Red Crag (b)	Sand. Sand, predominantly medium, brown to red-brown, with a trace of gravel.	(7.9)	26	(11.3)	37
	Sand, medium, shelly.	(1.2)	4	(12.5)	41
London Clay	Blue-grey clay.	(0.9+)	3+	(13.4)	44

(a) Insufficient gradings to calculate means

(b)

			%
Gravel	1%	+16 mm :	0
		−16 +4 :	1
Sand	98%	−4 +1 :	20
		−1 +¼ :	60
		−¼ +1/16 :	18
Fines	1%	−1/16 :	1

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
2 - 5	0	49	24	25	2	0
5 - 8	No gradings available					
8 - 11	1	21	67	11	0	0
11 - 14	0	17	68	15	0	0
14 - 17	0	36	60	4	0	0
17 - 20	No grading available					
20 - 23	2	17	61	18	2	0
23 - 26	0	20	49	29	2	0
26 - 29	0	42	47	9	2	0
29 - 32	1	9	65	24	1	0
32 - 35	1	7	62	29	1	0
35 - 38	3	4	61	32	0	0
38 - 41	3	7	61	27	2	0

TM 24 SE 17 2640 4138 Bucklesham, Suffolk

Surface level (+ 20.7 m) + 68 ft
Water struck at (+ 13.7 m) + 45 ft
Wirth B1, 6 inch diameter
November 1968

Overburden (0.6 m) 2 ft
Mineral (9.1 m) 30 ft
Bedrock (0.6 m +) 2 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, medium-coarse, yellow. Gravel, subangular to subrounded flints with some rounded quartz.	(1.8)	6	(2.4)	8
Red Crag	(b)	Sand. Sand, predominantly medium, brown. Occasional pebbles.	(5.5)	18	(7.9)	26
		Sand, medium, brown, shelly.	(1.8)	6	(9.7)	32
London Clay		Blue-grey clay.	(0.6+)	2+	(10.3)	34

				%	Depth below surface (ft)	Fines	Percentages Sand			Gravel	
						$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel	23%	+16 mm :	8	2 - 5	0	6	40	28	19	7
			−16 +4 :	15	5 - 8	1	11	40	28	11	9
	Sand	76%	−4 +1 :	28							
			−1 $+\frac{1}{4}$:	40							
			$-\frac{1}{4}$ $+\frac{1}{16}$:	8							
	Fines	1%	$-\frac{1}{16}$:	1							
(b)	Gravel	3%	+16 mm :	0	8 - 11	0	7	59	30	4	1
			−16 +4 :	3	11 - 14	No grading available					
					14 - 17	0	29	44	25	2	0
	Sand	96%	−4 +1 :	26	17 - 20	0	15	59	19	5	2
			−1 $+\frac{1}{4}$:	56	20 - 23	3	13	55	26	3	0
			$-\frac{1}{4}$ $+\frac{1}{16}$:	14	23 - 26	4	10	57	26	3	0
					26 - 29	1	11	59	28	1	0
	Fines	1%	$-\frac{1}{16}$:	1	29 - 32	2	10	56	26	5	1

TM 24 SE 19 2777 4373 Waldringfield, Suffolk

Surface level (+ 22.6 m) + 74 ft
Water struck at (+ 7.3 m) + 24 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.6 m) 2 ft
Mineral (16.5 m) 54 ft
Bedrock just touched

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Red Crag	Sand.				
	Sand, fine-medium, pale brown, occasional pebbles	(5.4)	17	(6.0)	19
	Sand, fine- medium in top (1.8 m) 6 ft, then mainly medium to coarse. Shell fragments abundant, also iron concretions. Fine gravel present throughout, mainly subrounded flint. Black phosphatic pebbles at base.	(11.1)	37	(17.1)	56
London Clay	Blue-grey clay.			Just touched.	

		%
Gravel 2%	+16 mm :	0
	-16 +4 :	2
Sand 97%	-4 +1 :	22
	-1 +¼ :	51
	-¼ +1/16 :	24
Fines 1%	-1/16 :	1

Depth below surface (ft)	Percentages Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
2 - 5	0	42	56	2	0	0
5 - 8	1	48	48	3	0	0
8 - 11	No grading available					
11 - 14	0	18	69	12	1	0
14 - 17	2	44	46	8	0	0
17 - 20	0	52	35	12	1	0
20 - 23	0	33	54	12	1	0
23 - 26	1	31	48	17	3	0
26 - 29	2	10	36	48	4	0
29 - 32	0	18	52	24	6	0
32 - 35	0	9	47	41	3	0
35 - 38	1	8	62	28	1	0
38 - 41	0	8	64	28	0	0
41 - 44	0	15	52	29	3	1
44 - 47	1	10	38	48	3	0
47 - 50	2	16	44	30	7	1
50 - 53	0	29	61	9	1	0
53 - 56	0	27	47	23	2	1

TM 24 SE 21 2761 4118 Kirton, Suffolk

Surface level (+ 22.3 m) + 73 ft
Water struck at (+ 13.4 m) + 43 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.3 m) 1 ft
Mineral (10.7 m) 35 ft
Bedrock (1.2 m +) 4 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, fine-medium in top (0.9 m) 3 ft, then mainly medium; yellow-brown. Gravel, subangular flints, rounded quartz.	(6.4)	21	(6.7)	22
Red Crag	(b)	Pebbly Sand. Sand, mainly medium, brown to dark brown. A little gravel.	(3.4)	11	(10.1)	33
		Sand, brown, shelly.	(0.9)	3	(11.0)	36
London Clay		Blue-grey clay.	(1.2+)	4+	(12.2)	40

				%
(a)	Gravel	11%	+16 mm :	3
			−16 +4 :	8
	Sand	89%	−4 +1 :	15
			−1 +¼ :	61
			−¼ +1/16 :	13
	Fines	0%	−1/16 :	0
(b)	Gravel	6%	+16 mm :	1
			−16 +4 :	5
	Sand	92%	−4 +1 :	18
			−1 +¼ :	64
			−¼ +1/16 :	10
	Fines	2%	−1/16 :	2

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 4	0	45	44	8	2	1
4 - 7	0	11	76	7	4	2
7 - 10	0	7	51	20	15	7
10 - 13	0	11	67	12	6	4
13 - 16	0	7	59	23	8	3
16 - 19	1	3	50	30	14	3
19 - 21	0	8	66	14	9	3
21 - 24	2	7	73	16	2	0
24 - 27	1	8	66	17	7	1
27 - 33	No grading available					
33 - 36	2	16	52	22	6	2

TM 24 SE 22 2762 4043 Kirton, Suffolk

Surface level (+ 23.5 m) + 77 ft
Water struck at (+ 19.2 m) + 63 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.6 m) 2 ft
Mineral (5.5 m) 18 ft
Bedrock (0.6 m +) 2 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Red Crag	Sand.				
	Sand, mainly fine-medium, red-brown, yellow or white, with thin clay lenses. Occasional flint pebbles.	(5.5)	18	(6.1)	20
London Clay	Blue-grey clay.	(0.6+)	2+	(6.7)	22

				%
Gravel	4%	+16 mm	:	1
		-16 +4	:	3
Sand	95%	-4 +1	:	10
		-1 +¼	:	39
		-¼ +1/16	:	46
Fines	1%	-1/16	:	1

Depth below surface (ft)	Percentages Fines -1/16	Sand +1/16-¼	Sand +¼-1	Sand +1-4	Gravel +4-16	Gravel +16
2 - 5	5	22	55	10	5	3
5 - 8	0	43	43	12	2	0
8 - 11	0	78	14	3	2	3
11 - 14	1	58	41	0	0	0
14 - 17	0	31	42	23	4	0
17 - 20	No grading available					

TM 24 SE 23 2838 4327 Hemley, Suffolk

Surface level (+ 21.0 m) + 69 ft
Water not struck
Wirth B1, 8 inch diameter
November 1968

Overburden (0.6 m) 2 ft
Mineral (8.2 m) 27 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, medium to coarse; gravel mainly angular to subrounded flints, occasional quartz.	(2.7)	9	(3.3)	11
Red Crag	(b)	Sand. Sand, mainly fine to medium, light brown, ochreous, or dark red-brown. Occasional gravel.	(3.7)	12	(7.0)	23
		Sand, medium-coarse, red-brown. Shelly. Rounded flints at base.	(1.8)	6	(8.8)	29
London Clay		Blue-grey clay.	(0.6+)	2+	(9.4)	31

					%	Depth below surface (ft)	Fines	Sand			Gravel	
							$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
(a)	Gravel	15%	+16 mm	:	4	2 - 5	0	4	43	30	16	7
			−16 +4	:	11	5 - 8	1	1	68	21	7	2
						8 - 11	0	15	36	37	9	3
	Sand	85%	−4 +1	:	29							
			−1 $+\frac{1}{4}$	:	49							
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	7							
	Fines	0%	$-\frac{1}{16}$	:	0							
(b)	Gravel	4%	+16 mm	:	1	11 - 14	2	34	53	9	2	0
			−16 +4	:	3	14 - 17	0	37	38	17	6	2
						17 - 20	0	24	54	21	1	0
	Sand	95%	−4 +1	:	22	20 - 23	0	7	50	41	2	0
			−1 $+\frac{1}{4}$	:	51	23 - 26	2	14	55	27	2	0
			$-\frac{1}{4}$ $+\frac{1}{16}$	:	22	26 - 29	2	16	49	24	6	3
	Fines	1%	$-\frac{1}{16}$	:	1							

TM 24 SE 24 2833 4237 Hemley, Suffolk

Surface level (+ 21.9 m) + 72 ft
Water struck at (+ 15.5 m) + 51 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.3 m) 1 ft
Mineral (7.3 m) 24 ft
Bedrock (1.2 m +) 4 ft +

		Soil.	Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Sand, mainly medium, pale brown. Gravel mainly subrounded flint with a little quartz.	(2.7)	9	(3.0)	10
Red Crag	(b)	Pebbly Sand. Sand, medium, red-brown, with occasional pebbles.	(3.7)	12	(6.7)	22
		Sand, red-brown, shelly.	(0.9)	3	(7.6)	25
London Clay		Blue-grey clay.	(1.2+)	4+	(8.8)	29

					%
(a)	Gravel	16%	+16 mm	:	5
			−16 +4	:	11
	Sand	83%	−4 +1	:	23
			−1 +¼	:	53
			−¼ +1/16	:	7
	Fines	1%	−1/16	:	1
(b)	Gravel	5%	+16 mm	:	1
			−16 +4	:	4
	Sand	91%	−4 +1	:	17
			−1 +¼	:	60
			−¼ +1/16	:	14
	Fines	4%	−1/16	:	4

Depth below surface (ft)	Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 4	0	2	43	31	15	9
4 - 7	0	4	63	21	9	3
7 - 10	2	16	54	17	9	2
10 - 13	No grading available					
13 - 16	0	22	58	16	3	1
16 - 19	1	10	64	23	1	1
19 - 22	No grading available					
22 - 25	11	11	55	13	7	2

Means (b) based on three samples only.

TM 24 SE 25 2859 4027 Kirton, Suffolk

Surface level (+ 22.9 m) + 75 ft
Water struck at (+ 17.1 m) + 56 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (2.4 m) 8ft
Mineral (5.2 m) 17 ft
Bedrock just touched

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
? Chillesford Beds	Clay, pale brown.	(2.1)	7	(2.4)	8
Red Crag	Pebbly Sand .				
	Sand, medium to coarse, brown, with gravel.	(3.4)	11	(5.8)	19
	Sand, brown, shelly.	(1.8)	6	(7.6)	25
London Clay	Blue-grey clay.		Just touched.		

				%
Gravel	10%	+16 mm	:	2
		−16 +4	:	8
Sand	88%	−4 +1	:	25
		−1 +¼	:	55
		−¼ +1/16	:	8
Fines	2%	−1/16	:	2

Depth below surface (ft)	Fines −1/16	Percentages Sand +1/16 −¼	Sand +¼ −1	Sand +1 −4	Gravel +4 −16	Gravel +16
8 - 10	1	2	47	28	13	9
10 - 13	2	3	51	36	8	0
13 - 16	2	14	72	10	2	0
16 - 19	1	2	57	33	5	2
19 - 22	2	13	55	22	7	1
22 - 25	0	13	50	24	12	1

TM 24 SE 26 2900 4204 Hemley, Suffolk

Surface level (+ 9.4 m) + 31 ft
Water struck at (+ 7.9 m) + 26 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.6 m) 2 ft
Mineral (1.5 m) 5 ft
Bedrock (0.9 m +) 3 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Red Crag	Sand.				
	Sand, fine, silty, red-brown.	(1.2)	4	(1.8)	6
	Silt and sand with clay.	(0.3)	1	(2.1)	7
London Clay	Brown weathered clay.	(0.9+)	3+	(3.0)	10

Depth below surface (ft)	Fines	Percentages Sand			Gravel	
	$-\frac{1}{16}$	$+\frac{1}{16}-\frac{1}{4}$	$+\frac{1}{4}-1$	+1–4	+4–16	+16
2 - 6	7	35	42	15	1	0

One sample only

TM 24 SE 27 2909 4133 Hemley, Suffolk

Surface level (+ 16.8 m) + 55 ft
Water struck at (+ 13.4 m) + 44 ft
Wirth B1, 8 inch diameter
November 1968

Overburden (0.6 m) 2 ft
Mineral (3.7 m) 12 ft
Bedrock (1.5 m +) 5 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Red Crag	Sand.				
	Sand, red-brown, fine with some silt and clay.	(1.8)	6	(2.4)	8
	Sand, red-brown, with some quartz gravel in upper (0.9 m) 3 ft.	(1.9)	6	(4.3)	14
London Clay	Brown weathered clay.	(1.5+)	5+	(5.8)	19

				%
Gravel	4%	+16 mm	:	2
		−16 +4	:	2
Sand	96%	−4 +1	:	18
		−1 +¼	:	42
		−¼ +1/16	:	36
Fines	0%	−1/16	:	0

Depth below surface (ft)	Percentages Fines −1/16	Sand +1/16−¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
2 - 8	No grading available					
8 - 11	0	39	37	16	3	5
11 - 14	0	32	47	21	0	0

Means based on 2 samples only

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INSTITUTE OF GEOLOGICAL SCIENCES

MINERAL ASSESSMENT UNIT

THE SAND & GRAVEL RESOURCES OF SHEET TM 24 (WOODBRIDGE, SUFFOLK)

Scale 1:25 000 or about 2½ Inches to 1 Mile

ORDNANCE SURVEY
SHEET TM 24
PROVISIONAL EDITION

This map should be read in conjunction with the accompanying Report which contains details of the assessment of resources.

3

EXPLANATION OF SYMBOLS AND ABBREVIATIONS

DRIFT

A-13	~	**Alluvium** - Sands, silts and clays, with thin gravels.
VT-3	⊀	**Undifferentiated Terraces of the rivers Deben and Fynn** - Valley gravels and sands with interbedded silts and clays.
B-5	⊏	**Brickearth** - Thinly bedded or laminated calcareous clayey-silts, usually free from stones.
Bc-6	⊹	**Boulder Clay** - Stiff blue-grey, brown weathering clay, with erratics of mainly chalk and flint, occasionally gravelly at base, with sand lenticles.
GS-12	⊹	**Glacial Sand and Gravel** - Principally yellow sand with variable amounts of flint and quartz gravel, the latter usually in a lenticular form. Occasionally intercalated silt and clay bands.

GLACIAL — RECENT AND PLEISTOCENE

SOLID

	CfB	**Chillesford Beds** (of Chillesford) - Green and yellow fine sands, silts and clays, usually highly micaceous. (Proved in boreholes only).
RC-1	RCg	**Red Crag** - Red-brown ferruginous sands with ironstone bands and nodules. Shelly in lower part. Phosphatic nodules often occur at base.
	LC	**London Clay** - Stiff blue-grey clay.

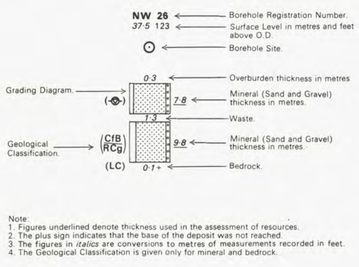
EOCENE

BOUNDARY LINES

- Geological boundary, Drift.
- Geological boundary, Solid. Broken line denotes uncertainty.
- Resource Block boundary.

BOREHOLE DATA

Boreholes represented on the map were drilled for M.A.U. in 1968 and 1969, and in the feasibility study of 1966.



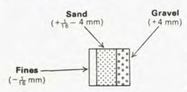
Note:
1. Figures underlined denote thickness used in the assessment of resources.
2. The plus sign indicates that the base of the deposit was not reached.
3. The figures in *italics* are conversions to metres of measurements recorded in feet.
4. The Geological Classification is given only for mineral and bedrock.

BOREHOLE REGISTRATION NUMBER

Each M.A.U. borehole is identified by a Registration Number, eg. NW 26. The letters refer to the quarter of this sheet and the figures to the I.G.S. Serial Number for that quarter. The unique designation for borehole NW 26 is TM 24 NW 26.

GRADING DIAGRAMS

Each grading diagram shows the mean particle size distribution of a distinct mineral deposit.



The height of the diagram is proportional to the mineral thickness.

The widths of the divisions show the proportions of **Fines, Sand** and **Gravel**.

CATEGORIES OF DEPOSITS

- **Exposed sand and gravel as mapped and assessed.** CAT-E3
- **Continuous or almost continuous spreads of mineral beneath overburden.** CAT-C1
- **Sand and gravel either not potentially workable (see Report) or absent.** CAT-A2

Where appropriate on other sheets a fourth category 'Discontinuous spreads of sand and gravel beneath overburden' is recognised.

RESOURCE BLOCKS

For the purpose of assessment the mineral-bearing land is divided into Resource Blocks (see Report). Each is designated by a letter.

Detailed records may be consulted at the appropriate offices of the Institute of Geological Sciences on application to the Director.

The representation on this map of a Road, Track, or Footpath, is no evidence of the existence of a right of way.

Geological lines from geological surveys on the One-Inch scale by F. J. Bennett, J. H. Blake, W. H. Dalton and W. Whitaker. Published on Old Series Sheets 48, 49 and 50 in 1881, 1882 and 1883. Transferred to New Series Sheets 207, 208 and 225 with minor corrections and published in 1927 and 1928.

Sand and Gravel Survey by R. Allender, J. D. Ambrose and S. E. Hollyer in 1968 and 1969. A. A. Archer and R. G. Thurrell, Heads, Mineral Assessment Unit.

1:25 000 Sand and Gravel Resource Sheet published 1972.
K. C. Dunham, D.Sc., F.R.S., Director, Institute of Geological Sciences, incorporating the Geological Survey of Great Britain, the Museum of Practical Geology and Overseas Geological Surveys.

2050/72

The Grid lines on this Sheet are at 1 Kilometre interval.
Heights are in feet above Mean Sea Level at Newlyn.

1 square inch on this map represents 99·639 acres on the ground.

Data quoted for an individual borehole refer strictly to that site from which reliable conclusions cannot be drawn about the thickness and grading elsewhere in the deposit, particularly in material as variable as sand and gravel. However, estimates of the volume and mean grading of the mineral as a whole in each Resource Block are given in the Report.

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Compiled from 6" sheets fully revised 1902-25. Other partial systematic revision 1938-53 has been incorporated.

Made and published by the Director General of the Ordnance Survey, Chessington, Surrey, 1955. Reprinted with minor corrections 1960.

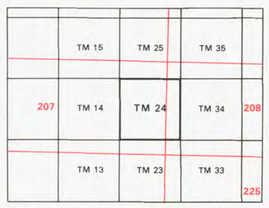

Diagram showing the relation of the National Grid 1:25 000 sheets with the One-Inch New Series Geological Sheets 207, 208 and 225.

Made and printed for the Institute of Geological Sciences by the Director General of the Ordnance Survey, Southampton.